McGraw-Hill Publishing Company, Inc. OCTOBER, 1937 Price 35c. per copy

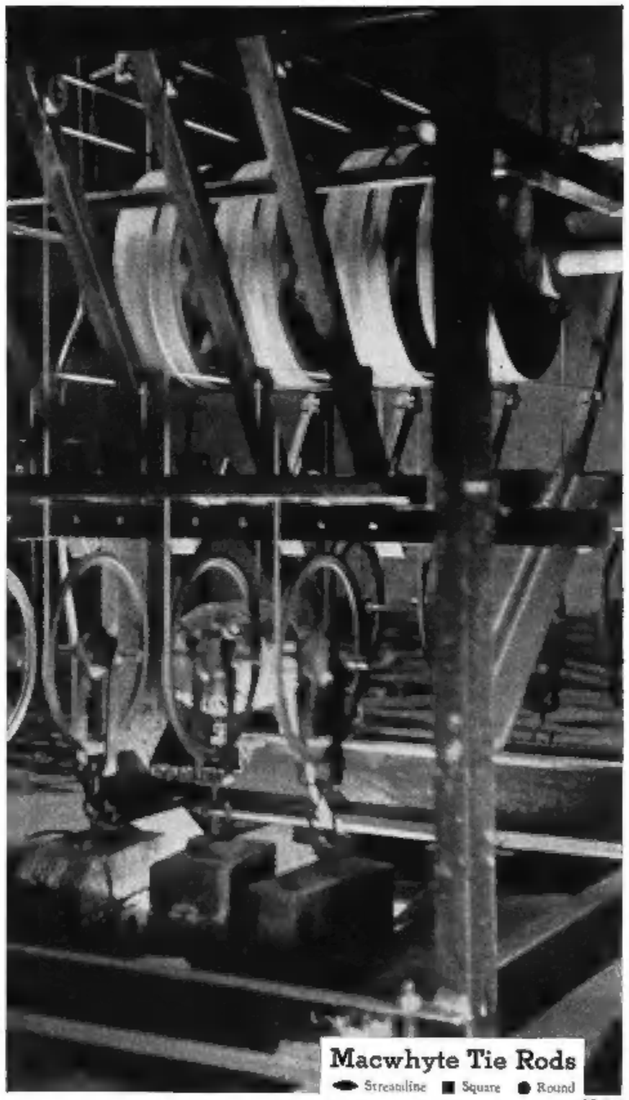
AVIATION

The Oldest American Aeronautical Magazine

MACWHYTE "Hi-Fatigue" AIRCRAFT CABLE

MUST WITHSTAND THIS GRUELING FATIGUE TEST

No higher fatigue resistance was ever built into an aircraft cable!



This intricate machine—designed in the Macwhyte Testing Laboratories—duplicates the fatigue conditions aircraft cable must meet in flight.

Running day and night, it measures the number of bending stresses the cable can stand under load.

Tests show Macwhyte Hi-Fatigue Cable gives *more hours of service—a lower operating cost.* That's why leading manufacturers and airlines are adopting this cable as standard equipment. Available either PREformed or non-preformed—tinned, galvanized and stainless steel.

Three Constructions

1 x 19 Non-Flexible

7 x 7 Flexible

7 x 19 Extra Flexible

Made in accordance with A-N specifications to meet all tensile, bending and salt spray requirements.

MACWHYTE COMPANY

Kenosha, Wisconsin. Specialists in the manufacture of Cable, Tie Rods and Braided Wire Rope Slings for Aircraft in strict accordance with Army-Navy Specifications.

THAT'S the exclamation you often hear when a Cub takes off. Seasoned fliers and beginners alike marvel at the superb performance of this easiest to fly, easiest to buy of all airplanes. Climbing close to 400 feet per minute with a take-off of less than 350 feet, even when fully loaded, the Cub gets in and out of the smallest field with ease and safety.

Moreover, its low landing speed (29 m.p.h.) makes it extremely easy to safely "sit down" anywhere. The wide-spread landing gear, roller bearing wheels and oversized tires make cross-wind and cross-furrow landings simple for even the novice. With the fastest take-off and shortest landing of any plane, the Cub is perfect for "off-the-airport" trips.

In the air the thousands of Cub fliers find its performance just as outstanding. Its dependable 4-cylinder motor provides plenty of power to get you there on time—*safely*—with adequate reserve for adverse conditions. And it has an economy that cannot be equalled—consuming less than 3 gallons of gas per hour and almost no oil!

Once you fly The New Silver Cub you will be amazed that you can buy so much airplane for only $1270 F. A. F. Lock Haven, Pa.—with only $425 down and the balance in easy monthly payments. But don't delay. Get yours at its present low price which is subject to change without notice.

Wherever you go, COUNT THE CUBS.

FREE! Send today for our handsome, new folder illustrating and describing The New Silver Cub and for the name of your nearest Cub dealer. Paste coupon below on penny post card, if you wish. You will be under no obligation.

TAYLOR AIRCRAFT COMPANY
107 A Street, Lock Haven, Pa., U. S. A.

Please send me your new, illustrated free folder and name of my nearest Cub dealer. No obligation.

NAME_____

ADDRESS_____

CITY_____ STATE_____

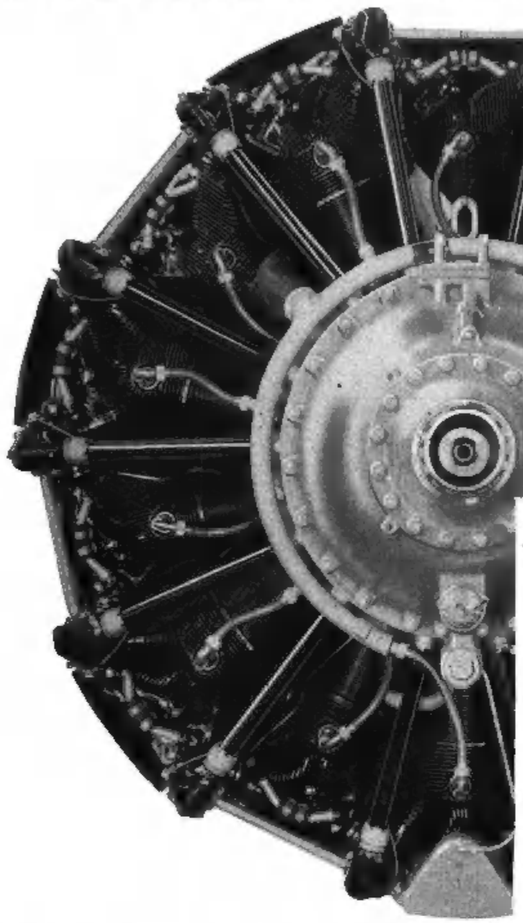
TAYLOR AIRCRAFT COMPANY
107 A St., Lock Haven, Pa., U.S.A.
Cable Address: CUB

The New Silver CUB
THE WORLD'S FASTEST SELLING AIRPLANE

Published monthly, price 35c a copy. Subscription rates—United States, Canada, Mexico and Central and South American Countries, $3.00 a year. All other countries, $6.00 a year or 24 shillings. Entered as second-class matter, September 3, 1936, at the Post Office, Albany, N. Y., under the Act of March 3, 1879. Volume 35, Number 10.

MINIMUM WEIGHT-TO-POWER

...thanks to the NICKEL ALLOY STEELS

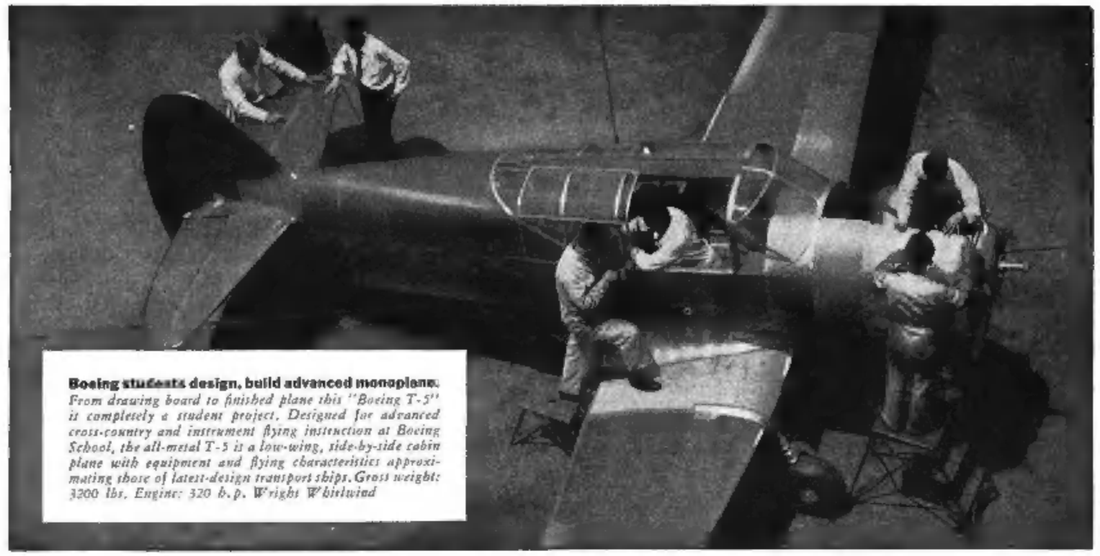


The early aircraft engine weighed 21 lbs. per h.p. Today, commercial air-cooled engines weigh as little as 1.2 lbs. per h.p. and are many times faster, sturdier and more efficient. Among the reasons for this improved efficiency and reliability are the Nickel Alloy Steels. Listed below are some of the applications for which these high strength-weight ratio steels are being used by well-known aircraft engine manufacturers both in this country and abroad. Consultation on the use of the alloys containing Nickel is invited.

NICKEL ALLOY STEELS USED IN AIRCRAFT POWER PLANT

PARTS	MECHANICAL REQUIREMENTS	STEEL USED		
		Designation	App. Comp. %	Treatment
Piston pins, oil pump gears, accessory drive gears	High wear and fatigue resistance in case; high core strength	SAE 2315	.15C 3.50Ni	Carburized and hardened
Fuel and oil pump shafts, valve rockers, bolts	Strength and toughness; subjected to torsional and fatigue stresses	SAE 2330	.30C 3.50Ni	Oil or water quenched from 1450° F.; tempered 900-1000° F.
Cam rings, knuckle pins, cam and oil pump drive gears, cam shafts, crankshaft gears, Diesel crankshafts	Good machining; superior wear and fatigue resistance in case; great core strength; low quenching temperature to minimize distortion	SAE 2512	.12C 5.0Ni	Carburized and hardened
Gear pins, piston pins, push rod ends, valve tappet rollers, cam rings, cam gears, Diesel wrist pins	Small parts of exceedingly high surface hardness and tough, shock-resisting core	SAE 3115	.15C 1.25Ni .60Cr	Carburized and hardened (double treatment)
Studs and nuts, washers, master rods, crankshafts, oil pump drive gears, magneto and tachometer drive gears, tappets, rocker arms	Creep resistance; higher elastic properties, good wear resistance; toughness	SAE 3140	.40C 1.25Ni .60Cr	Oil quenched from 1500° F.; tempered 900-1200° F.
Magneto and oil pump gears, propeller hub cones, accessory drive shafts and starter gears	Fatigue resistance; high strength combined with ductility	SAE 3340	.40C 3.50Ni 1.50Cr	Oil quenched from 1425° F.; tempered 900-1000° F.
Crankshafts and connecting rods, spiders; Diesel knuckle pins	Depth hardening for large sizes; impact resistance; machinability at high hardness	SAE 4345	.45C 1.75Ni .65Cr .35Mo	Oil quenched from 1500° F.; tempered 800-1000° F.

THE INTERNATIONAL NICKEL COMPANY, INC., NEW YORK, N.Y.



Boeing students design, build advanced monoplane. *From drawing board to finished plane this "Boeing T-5" is completely a student project. Designed for advanced cross-country and instrument flying instruction at Boeing School, the all-metal T-5 is a low-wing, side-by-side cabin plane with equipment and flying characteristics approximating those of latest-design transport ships. Gross weight: 3200 lbs. Engine: 320 h.p. Wright Whirlwind*

How to judge where you're apt to get in Aviation

Industry heads say: *A man's choice in training schools indicates how far he's likely to go.*

Only hard-driving men who aim to "go places" search out the school best able to prepare them for *careers* in aviation.

If you are one of these, Boeing School (Division of United Air Lines) has much to offer you.

1. The only U.S. *Approved School* owned and operated by a major airline—United. It draws on 100,000,000 miles of transport experience. And it is in close touch with leading aircraft and engine manufacturers.

2. Your instructors are specialists with up to 24 years of experience in their fields. The staff of 30 means an average of one instructor for every 7 students. You get more hours of individual attention!

3. Exceptional school equipment includes: 10 training planes; 15 shops and laboratories; hangars; technical library and flight house.

4. Location. An *actual aviation center*—at United's Pacific Coast terminus, the A-1-A Oakland Airport.

For complete facts, mail coupon today.

Next regular enrollment January 3, 1938

Two basic BOEING SCHOOL ground courses

"AIRLINE MECHANIC." This 12-month course covers 39 subjects—prepares you for motor overhaul and maintenance, shop work, field service, metal construction, radio and instrument work . . . fits you for many types of jobs at airports, factories, and on the lines.

"AIRLINE OPERATIONS." An 18-month course offering thorough preparation for radio, metals, instruments, electrical, engines, sales and administrative work . . . a solid background for such positions as assistant field manager, field clerk, traffic man.

5 OTHER GROUND COURSES—from 12-week "Aircraft Sheet Metal" to 24-month "Air Transport" and "Practical Aeronautical" engineering courses.

7 PILOT COURSES—from "Private Pilot" to 18-month "Airline Pilot and Operations," the standard of America.

HOW MUCH EDUCATION TO ENTER?

For 8 important courses you need only a high school education. The other 7 courses require various amounts of college or special training. BOEING BULLETIN fully describes school, courses and requirements. Contains valuable guide to opportunities, qualifications, duties, lines of promotion. Prospective students and vocational counselors; send for free copy today.

BOEING SCHOOL of AERONAUTICS A DIVISION OF UNITED AIR LINES

BOEING SCHOOL OF AERONAUTICS

Department T-22, Airport, Oakland, California:
Please send BOEING SCHOOL BULLETIN without obligation to me (I'm interested in courses checked):

Courses requiring high school:
- ☐ Airline Pilot and Operations
- ☐ Transport (or) L. C. Pilot
- ☐ Private (or) Amateur Pilot
- ☐ Airline Operations
- ☐ Airline Mechanic
- ☐ Aircraft Sheet Metal

Courses requiring 2 yrs. pre-eng.:
- ☐ Air Transport Engineering
- ☐ Practical Aeronautical Engineering

Courses for eng. grad. only:
- ☐ Airline Technician
- ☐ Dispatching & Meteorology

Courses requiring special training:
- ☐ Special Airline Pilot
- ☐ Home Study Courses
- ☐ Non-scheduled Instrument Rating

Note: Link Trainer Instruction available to students in all courses.

Name _____ Age _____
Address _____ Years in High School _____
City _____ State _____ Years in College _____

EASTERN AIR LINES AVIATION PRODUCTS

For 9 Years Eastern Air Lines' Planes Have Flown On Goodrich Tires . . . Goodrich DE-ICERS and Many Other Goodrich Aviation Products Give Extra Safety . . . Extra Comfort, Too

EASTERN AIR LINES keeps these giant *Goodrich-equipped* Douglases "on the go" winter and summer, flying between New York, Chicago and many key cities of the South. And when Eastern began its famous "Every Hour on the Hour" service between New York and Washington, these planes offered air travelers the most frequent air service in America.

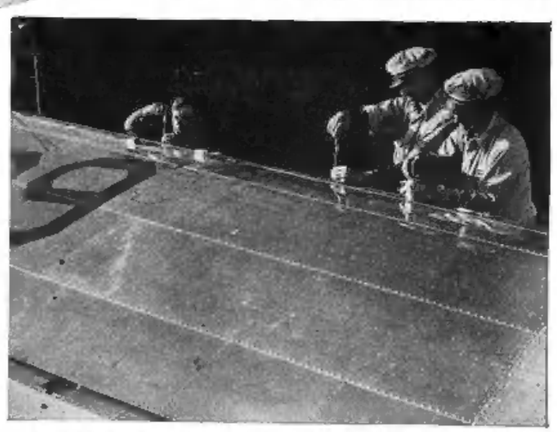
FROM the Hudson River to the Gulf . . . from the Great Lakes to the Florida Keys, Eastern Air Lines' far-flung service encounters all types of weather . . . many types of landing terrain . . . operating conditions which "Eastern" constantly meets with the latest, most scientific safety developments.

Thus whenever air becomes ice-laden, the Goodrich DE-ICERS on "The Great Silver Fleet" immediately go into action. Wings, propellers, all parts of these airliners which may collect ice are protected . . . kept clear during winter and high altitude flying.

Goodrich gives double *safety*

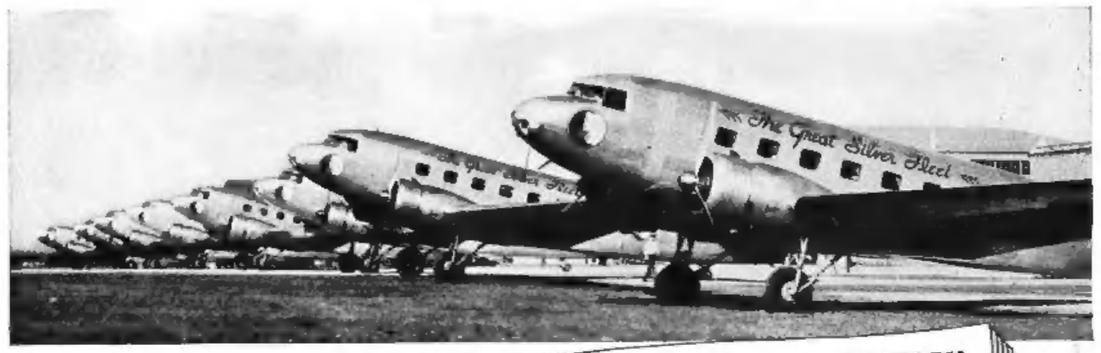
Not only in the air but on the ground Goodrich Aviation Products mean *extra* safety. For years Goodrich Low Pressure Tires have been standard equipment on Eastern Air Lines' planes. And today . . . on Eastern's planes that are bigger and faster than ever . . . Goodrich Airplane Silvertowns have the landing characteristics that mean safety and smoothness . . .

PROPELLERS THAT "SHED" ICE. Realizing that *complete* protection against ice must include propellers as well as all other parts of the plane that collect ice, Goodrich engineers developed the "spinner" and "slinger ring" assembly shown here. The propeller blades are constantly bathed with a solution that defies the formation of ice.



ICE "KEEP OFF"—and the Goodrich Wing DE-ICER means just that. Here an Eastern Air Lines' plane is having the protective Goodrich rubber "shoe" installed on the leading edge of the wing. When alternately inflated and deflated, these huge shoes crack the ice and it is blown away as soon as it forms.

SPECIFIES GOODRICH FOR EXTRA SAFETY



the ability to land on ice-crusted fields in the north or on the sunny sands of the south.

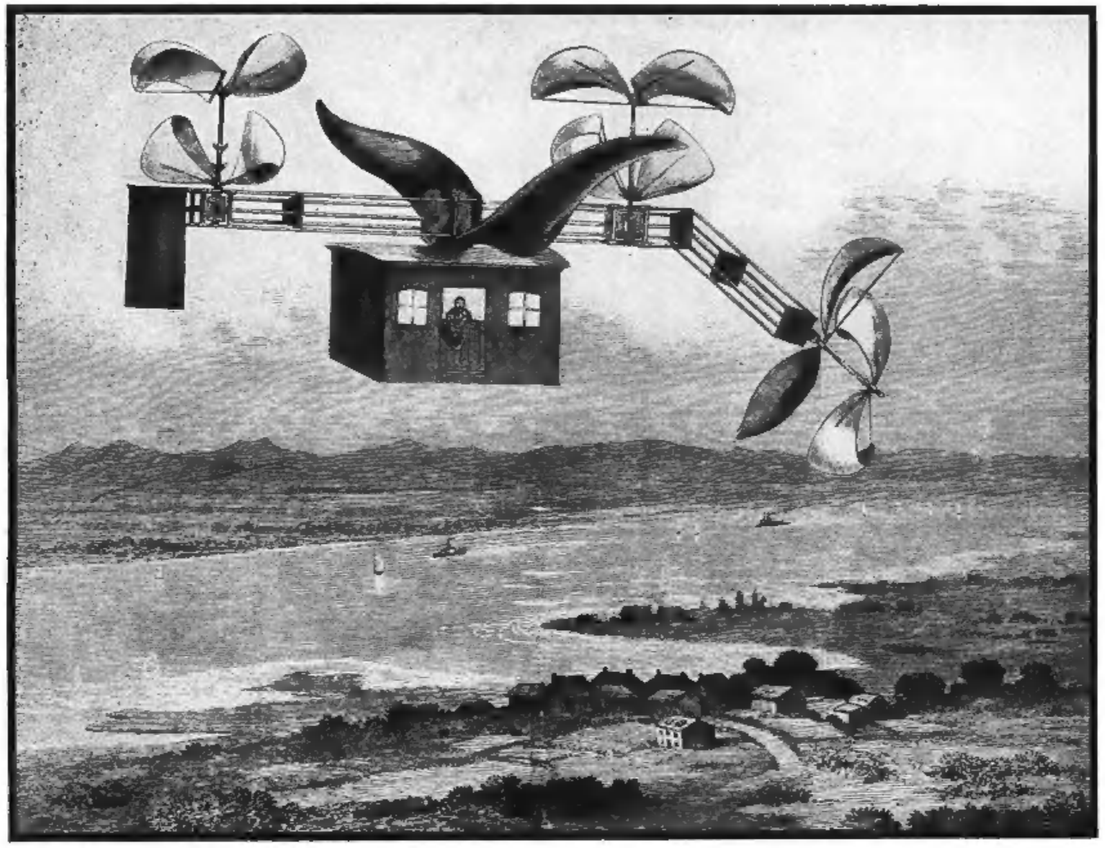
Remember, the same engineering ability that produced the Goodrich Airplane Silvertown and the Goodrich DE-ICER is available in over 40 other Goodrich products specially made for aviation and used by the leading pilots, plane makers and air lines of the world. Before you build any plane . . . whether it will be licensed for one passenger or 50 . . . find out how Goodrich Aviation Products will increase its safety and efficiency. Write Dept. 645, Aeronautical Division of The B. F. Goodrich Co., Akron, Ohio, for complete information. Ask for a copy of "Goodrich In Aviation."

Goodrich *Airplane* Silvertowns

THE SAFEST AIRPLANE TIRE EVER BUILT

Over 40 Rubber Products for Airplanes — including Tires — Tail Wheels — Abrasion Shoes — DE-ICERS — Matting — Rubber Hose — Grommets — Shock Absorber Cord — A Complete Line of Rubber Aeronautical Accessories.

HE WANTED TO BET $1,000 THAT HE COULD FLY WITH HIS FEET



NEITHER a lunatic nor a sensation-seeker was W. J. Lewis of New York, when in 1876 he offered to bet $1,000 that he could fly from New York to Philadelphia in 30 minutes, using foot power only.

He had already achieved widespread notice in scientific circles by making a model flying machine that flew alone and could be guided. It was powered by a three-pound clock spring.

Had he found a taker for his bet, Lewis would have been rudely disillusioned about the amount of foot-pedalling necessary to keep a full-sized flying machine in the air. But he found no takers; nor could he find backers of a steam-powered craft he proposed to build, although he flew a 4½-foot model of it at many scientific meetings.

Had gasoline been known at the time that Lewis was working on his machine, he might have been included among aviation's immortals. Instead, it took three more decades to develop a successful power-weight ratio with a gasoline engine.

To make further aeronautical progress a matter of years instead of decades, engineers of the Ethyl Gasoline Corporation are constantly cooperating with aviation engineers in seeking new ways to improve the inseparably wedded performance of fuels and engines. Ethyl Gasoline Corporation, Chrysler Building, New York, N. Y.

THE
OLDEST AMERICAN
AERONAUTICAL MAGAZINE
AVIATION
Established 1916
McGraw-Hill Publishing Company, Inc.

McGraw-Hill Publishing Company, Inc.

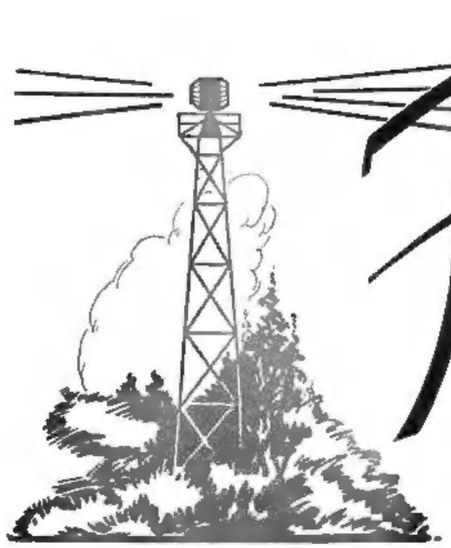
Publication office, 99-129 North Broadway, Albany, N. Y. Editorial and executive offices, 330 West 42nd Street, New York, N. Y.

Chicago, 520 North Michigan Ave.
San Francisco, 883 Mission St.
Los Angeles, 8121 Dalton Ave.
Aldwych House, Aldwych, London, W. C. 2
Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta, Ga.

Published monthly, price [illegible] a copy. Subscription rates—United States, Canada, Mexico and Central and South American countries, $3.00 a year. All other countries, $6.00 a year or 24 shillings. Entered as second-class matter, September 3, 1936, at the Post Office, Albany, N. Y., under the act of March 3, 1879. Printed in U. S. A. Cable address "McGrawhill, New York." Member of A.B.C. Copyright 1937 by McGraw-Hill Publishing Company, Inc., [illegible] West 42nd Street, New York, N. Y. The following publications are combined with AVIATION: AERONAUTICAL ENGINEERING, AIRCRAFT JOURNAL and THE AVIATION NEWS. All rights to these names are reserved by the McGraw-Hill Publishing Company.

Contents for Vol. 36, No. 10

OCTOBER 1937



Flashes

From the Skyways of the World

» WE'LL MAKE A GUESS that the most enjoyable part of the recent air races for Mrs. Rudy Kling was immediately following the Thompson Trophy. The photographers each insisted that Rudy kiss his wife for a picture. One by one they poised their cameras and then pleaded, "Just one more kiss Rudy." Even though Mrs. Kling was probably kissed more copiously than at any time since the wedding bells rang out, neither she nor Rudy seemed to mind—particularly.

» RACE PLANES this year proved to be "hot" in more ways than one. We helped Earl Ortman peel off his coat and vest after his flight from Los Angeles in the Bendix race and found them both dripping with the perspiration Earl had shed en route. By contrast Mr. and Mrs. F. C. Hall and their pilot Milo Burcham stepped jauntily from the Lockheed 12 after a fast Bendix flight with all the comforts of airline travel, and apparently at just the right temperature, for there was no evidence of wilted collars.

» MAYBE SOME OF THE SUCCESS attained by Menasco engines at Cleveland this year should be attributed to the father and son combination on the field. While Al Menasco was up in the stands cheering his engines on, his fourteen year old son Bill Menasco was down in the pits helping Johnny Lind, Menasco service manager. Incidentally, Al and Bill report that during the four days of racing there were no cases of mechanical failure on any of the eight or nine Menasco engines.

» JUST IN CASE no bouquets are tossed to Mike elsewhere in this issue of AVIATION we'll say right here that one of the most difficult aeronautical stunts we've ever seen performed was that of landing a Taylor Cub back on a moving automobile as staged successfully each day of the races at Cleveland by Mike Murphy.

» NOT FAR from the foot of the Bald Eagle Mountain we found the world's most prolific bear. Each day she gives birth to at least five cubs and that is far below her capacity. She is the new factory of the Taylor Aircraft. (See page 28). Ever since the move to Lock Haven, a crew of high priced time and motion experts have been taking the kinks out of the production line and now the place is beginning to look a little like Detroit. And, by the way, Energetic Sales Manager Ted Weld tells us they are going to change the name of the district by painting "Cub Haven" on the roof of the plant.

» IGOR SIKORSKY cheerfully admits that he is no longer in the "before forty" classification by quite a margin, but he tells us that on a recent test flight in the new Sikorsky "dreadnaught" Navy bomber he went to better than 21,500 ft. altitude without resorting to oxygen. He did make one valuable contribution to high altitude research, however, by taking along a bottle of good port wine which he sipped at intervals to test its efficacy

In This Issue

The payoff on the late National Air Races of 1937. The story appears in two parts,—a race round-up giving the technical angles of the race machines and an account of the Institute of the Aeronautical Sciences' meeting,—and a news story of who won what on page 55. . . . Architect John Walter Wood winds up his airport series with a description of an "ideal" layout to fit his previously published specifications. Mr. Wood's airport plan originated about 1930; it was patented in 1933. His new book on airports is due to appear shortly. . . . A glimpse inside America's busiest airplane factory,—Taylor Aircraft at Lock Haven. . . . How one fixed base operator not only weathered the depression but has since built a successful business for himself on East Boston Airport. . . . John Millar of Millar, Limited, at present visiting aviation centers in the United States, tells how the Imperial Airways' radio works on trans-Atlantic services. . . . F. R. Shanley, one of the authors of the recent article "Stress Ratios" which is now in great demand in reprint form, is with us again, discussing a new approach to the solving of box beam problems. . . . Some interesting new ships which put in an appearance at the races, Gwinn's Air Car, Waco's three-wheeler, Sundorph's Bendix racer,—and Menasco's Super-Buccaneer engine.

on a system functioning under stress of reduced oxygen supply. Igor says the wine was efficacious.

» WE KNOW you readers are just as eager as we are to learn the latest dope on Howard Hughes' projected flight with a special Sikorsky S-43, so we did some high powered inquiring around while on a recent visit to the Sikorsky factory. If you'll promise not to tell a soul we'll pass along the information that the Sikorsky is still being prepared for the flight. But where and when and how and who and why we couldn't get anyone to say.

» THE OLD WEST is still changing. Our picture which we've always had of a lonely cowboy and his pinto roaming through the mesquite rounding up his straying dogies has suddenly been completely altered. We have just learned that Mr. R. B. Cowden of Eldorado, Texas, rides the range in a Ranger-powered Fairchild "24", with which he directs his round-ups from the air.

» WAY BACK IN MYTHICAL 1929 we visited Aubrey Hess at his Alliance (Ohio) plane and engine plant. At the time we flew in his trim "Bluebird," with its efficient Argo engine. We listened to his brilliant plans for development of the light plane market. Shortly afterward Aubrey's untimely death closed the plant and for years it remained idle. Then a few days ago we revisited the scene and saw the same factory bursting its sides with activity, with light planes popping off the end of the production line every few hours and orders piled high on the sales manager's desk. Under the skillful guidance of veteran designer C. G. Taylor and Bill Young, who used to be with AVIATION, the Taylor-Young Company is rapidly becoming an important unit in the industry. With Si Vaughan directing production activities, Frank Sullivan holding the purse strings and Carl Woodin holding back the besieging distributors, the boys have a mighty fine team. And when you go to Alliance don't fail to see C.G.'s latest production accomplishment,—a pair of dynamic two-year-old twins.

» WHEN THE DEPRESSION BROKE a good many designers and manufacturers were smart enough to see that the best thing to do was to hibernate. Now they are coming up out of their holes and sniffing hungrily at the new markets that have developed in the last year or two. One of these smart ones was V. C. Babcock of Akron, who in the late twenties designed a trim two-seater that may have been ahead of its time. A short time ago he took it out of storage, dusted it off, and found it fit the present picture. (Description, page 46.) So he teamed up with an automobile distributor named Vlcek who has a lot of ideas about merchandising, and formed a company that will be heard more of later. They are tooling up now and other designs are on the boards. We had a chance to fly the present ship at Akron but it didn't add to our flying experience because it almost flies itself.

While at Akron Airport we saw the site of the Soap Box Derby and some of the other devices for public attraction being developed by Live Wire Shorty Fulton, manager of the airport. When the plans are completed, Akron airport will be an important sports-center for the district.

"Maguire's taken on a hostess"

» The ultimate in slide rule development has been accomplished by Silas A. Morehouse, veteran TWA pilot who, perhaps mentally deranged from constant use of his circular optimum flight path slide rule, has developed a patented Race Horse Selector.

Side Slips

By ROBERT OSBORN

» AT CLEVELAND we saw The Intrepid Aviator lying in the shade of a parked ship and he beckoned us over to give him a light on one of our cigars. He said he saw where a pilot had a forced landing in the Great Salt Lake the other day and had taken off his outer clothes, fastened a five dollar bill in his belt and swam ashore, and he couldn't

understand why a pilot should be flying around the country when he already had five dollars.

» FROM SEPTEMBER AVIATION: "Two of the most promising Greve and Thompson racers are the entries of Wm. Schoenfeldt and Rudy Kling. Schoenfeldt's racer was the Menasco B6S powered Ryder flown by Don Rae in 1936, but it has now been completely rebuilt by Schoenfeldt and his helper Rodney Nimmo, with assistance of Jess Hall, veteran assistant to Ben O. Howard on Mike, Ike and Mister Mulligan."

—who helped the Wright Brothers on their Model "B"?

» SEEMS TO BE HIGH TIME that we established the aeronautical equivalent of the Jockey Club to keep track of the pedigrees of some of these racing ships. We wouldn't be a bit surprised to hear that the designers of a couple of the home-made racers this year had used some fittings from the Curtiss model which won the Race at Rheims in 1909.

» WE MUST CONGRATULATE the management of the National Air Races for having the foresight to select the last day of the meeting as "Labor Organizations Day." If any of them had decided to stage a sit-down strike the officials would have had a year in which to get them out of the stands. Or, if the CIO and AF of L members had started throwing seats, pylons, timers or midget racers at each other, it wouldn't have been such a serious matter on the last day.

» STRANGELY ENOUGH, the Air Races gave us the first definite comparison in one commodity between the workings of a democracy and a dictatorship. Here the parachute jumpers were paid $17.50 for each jump, whereas in Soviet Russia the reward would have been a free pass on the street cars, and possibly the Order of the Red Star.

» IT SEEMS TO US that the results of the National Air Races for 1937 can be very well summed up in the single statement that Rudy Kling is now able to pay off the mortgage on the old family homestead and possibly lay up a few barrels of potatoes and sides of bacon against the coming winter.

» WE SEE BY THE PAPERS that a stewardess on one of the air lines has just received the first commercial radio telephone operator's license to be issued to her sex.

As there will probably be more of

these young lady hostesses obtaining telephone operator's licenses, it would seem that the designers of future transports would do well to incorporate a counter for the tired business man passenger to lean on while he trades "wise cracks" with the operator.

» WE ARE VERY SORRY to have to make this prediction but it has been forced on us. Very shortly another large battleship will be sunk by an aerial bomb, or some other unusual military accomplishment will be credited to the airplane.

How can we make such a remarkable prediction? It's really very simple. The military and naval commanders-in-chief of several nations have just issued another well-thought-out conclusion that the airplane isn't much good as a tactical military weapon.

» EMBARRASSING INTERNATIONAL SITUATION: The winning of the first three places by Italian airplanes in the French Air Derby from Paris to Damascus and return.

WAR AND RUMOR THEREOF

CERTAINLY one can view the general state of world affairs today with any degree of complacency. Although, diplomatically speaking, no war actually exists anywhere, there are several little ruckuses going on in various corners of the planet that look pretty much like the real thing.

Recently the President observed that our people are getting jittery. No secret to readers of AVIATION that we were a little jittery ourselves after touring about in the aviation centers of Europe last winter. We felt then and we still feel that we are in a rather fortunate situation at present due to our relative isolation (geographically) from the "hot spots". But we would like to remind the Fathers in Washington that our splendid isolation will not last indefinitely and that it is only a matter of good sense under present world conditions that we take some account of our defenses, just in case.

No one can deny that in aviation we have one of our strongest defensive weapons. Our army and our naval people have made splendid progress in the past year or two. In materiel and in personnel we have the nucleus of the finest defensive air force in the world. Technically our equipment can compete with anything anywhere, and our *potential* "mass production" manufacturing facilities cannot be matched.

But we cannot rely too long on potentials. Although we never again can be caught short in aviation as we were in 1917, it does take time to build up a potential industry into one that can actually produce at rates required by modern warfare. We have seen the great factories of Germany and Britain and have some idea how far we are behind in actual productive capacity. With world affairs moving as they are, it is downright dangerous for us to dally much longer. Five-year expansion programs must be pushed through in one or two years. We must bring our defenses to the minimum required for national safety before we can start to look around. The time has actually arrived which we predicted in writing about European re-armament in January of 1937 when our own government must think in terms of thousands of aircraft rather than dozens or hundreds.

BALLYHOO AND BLOOD

Every year we go to the National Air Races thinking that "this year things will be different". Every year we come away wondering what it was that made us so optimistic,—and 1937 is no exception. True, there were

bright spots. The Thompson Race was exciting enough to be worthwhile. The design novelties of Waldo Waterman's Arrowbile, Joe Gwinn's Air Car and the tricycle-mounted Waco, attracted more than passing interest. And Lester Gardner's technical meeting on "Designing for Speed" (See page 24) may hold some significance for the future.

But all these things, excellent enough in themselves, fought a losing and uphill battle against a tremendous flood of bunk and ballyhoo that poured out of loud speakers,—against the blood-lust stirred up by a pre-race fatality, and an actual crash in front of the stands. Not to mention daredevil race drivers and their leaping and rolling automobiles, a feature which seemed totally inexcusable. It simply labeled the races for a super-colossal country fair designed solely to shake down the visiting firemen.

As we pointed out last month, we had hopes that the industry could realize the value of the occasion as a great show of what aviation can do, of where it is going. What an opportunity to show half a million people a real pageant of aviation progress! But as usual, we muffed it.

Almost the only educational feature of the Cleveland gymkhana was the regular coming and going of the commercial transports on the opposite side of the field. Casual mention was made now and again of these ships, but it is doubtful if many of the non-flying customers in the stands could have been induced to buy an airline ticket to New York or Chicago after witnessing the breath-taking exhibits under their noses or while listening to the jitter-producing comments of the official announcer.

If air racing is ever to have any significance, if it is ever to make any just claims that it makes any technical contribution or that it "improves the breed" it must go back into the hands of the industry. It must be by or of and for the industry with the benefits accruing to the industry, both in technical gains and in proper public education.

Obviously however, it will never get anywhere until someone steps up who is willing to pay the bill. A great deal was made of the fact that over $80,000 in prizes was available at Cleveland this year, but actually the largest single "take" in prize money was about $14,500. Stack this up against the $3,000,000 that Italy spent for the Macchi racer to break the existing world speed record, the $500,000 fund set up by Lady Huston for a Schneider Cup racer and the difficulty becomes apparent at once.

It is difficult to see where the breed has been much improved by recent racing when a group of very highly specialized machines with barely room for a pilot and with absolutely no payload, averaged under 260 m.p.h. in this year's Thompson race, when at the same time no first rate power in the world would give serious consideration to any pursuit airplane that could not top 300 m.p.h. with full military load and with a certain amount of comfort and convenience for the pilot.

Edmund Allen, one of the foremost engineering test pilots in the world, summed up the whole situation very neatly when at the Institute meeting, he likened present-day race plane builders to the designers of the early days of aviation when every flight was a test flight and when the pilot had to be a daredevil, and not an engineer.

Actually, however, those days are pretty well behind us, for both ground and flight-testing technique have developed to the point that the old trial-and-error method cannot stand up against the scientific approach. He maintained that there is little that may be learned from the risky and uncertain business of flying back-yard-built airplanes around closed courses that could not be more safely and more accurately determined on test blocks or in carefully controlled design, construction and preliminary test flying. The only way Allen could see that racing would aid the modern aeronautical industry would be if rules at the races tended to develop useful airplanes capable of carrying reasonable payloads and with safe landing and flying characteristics.

With that idea we are inclined to agree. If new specifications can be written, calling for performances beyond the limits at present attainable by the military and by commercial types, and if the government would see fit to post prizes large enough to interest the major aircraft companies, then and only then, will air racing make any real contribution to the art. Failing that, the National Air Races will have only ballyhoo and blood to sell to the public.

1. Captain Alexander Papana, Roumanian Air Force, stands beside the new Bellanca he plans to fly home via Paris to Roumania. The monoplane is powered with two Mencaco engines in the wings; a Fairchild Ranger in the nose. (Wide World)

2. Rudy Kling and wife pose with three of the top prizes won by American racing pilots—results of his four day campaign at the Cleveland Races. Trophies left to right: The Louis W. Greve for 500 cu.in. engines; the Thompson for the 200 mile unlimited free-for-all; the Clifford W. Henderson for the pilot winning most points. (Wide World)

3. The "lower component" of the Mayo composite transatlantic mailplane begins flight tests off Rochester, England. (Flight) The "upper component" is also at flight-test stage. (See picture in The Aviation News.)

4. Bruno Mussolini and Lieut. Col. Bisso walk away from the Savoia Marchetti trimotor they flew in third place in the Istres-Damascus-Paris Air Race. (Wide World)

5. First photograph released of the XFM-1 multi-seater fighter, built by the Bell Aircraft Company at Buffalo and tested there last month for the first time by Lieut. Benjamin Kelsey at Wright Field. He expressed himself "pleased . . . delighted." (Air Corps photo)

Camera's Eye on the News

Race Round-up

1937 National Air Races long on competition, short on speed. Technical details of the outstanding race planes, and a look-in on the technical meeting of the Institute of the Aeronautical Sciences.

International

Vincent Bendix congratulates Frank Fuller on his record-breaking victory in the Bendix Trophy Race.

International

World Wide

Roscoe Turner and [redacted] Twin-Wasp powered Meteor racer which was built to [redacted] specifications for the [redacted]

AVIATION

The Henderson brothers draw their biggest crowd at Cleveland. Cliff at left and Phil, third from left.

FOR THOSE WHO FOLLOW AIR RACING purely as a sporting spectacle the 1937 National Air Races should have proved completely satisfying, but if there are any who look to the races for design improvements and speed advances they must have looked in vain. With all due credit to the remarkably fine performances of such planes as Wittman's D-12 Special, the Turner Twin Wasp "Meteor" and Rudy Kling's Folkerts "Speed King," the final results in miles per hour were nothing to get all het up about. Even had Wittman continued [redacted] to win the Thompson Trophy at the speed he established for the first seventeen laps the time would have been slower than Detroyat's at Los Angeles. And Kling's winning speed was disappointingly close to the 1932 time of Jimmie Doolittle at 252.68 m.p.h., an overall advance for [redacted] five year period of barely over 4 m.p.h. On the other hand, five racers this year finished at better than 250 m.p.h., over the longest course on which the Thompson Trophy Race has yet been staged, while Michael Detroyat and Jimmie Doolittle had previously been the only pilots to break 250 in Thompson competition, and both set such times over shorter distances.

It is of interest to consider that there are a number of commercial or military planes in this country which could take [redacted] a full load of fuel and passengers, or equipment, and give this year's Thompson crop [redacted] distinct race. Among such planes might be classed the new Lockheed 14, the Curtiss twin engined attack, or the Bell XFM-1 pursuit. Furthermore the times recently set up by military and sport type planes in the European meet at Zurich are quite close to Thompson Trophy speeds. There Karl Francke, of Germany, flew a 31 mi. course at approximately 254 m.p.h.; Major Seidmann, in a 650 h.p. Messerschmidt flew the 228 mile high altitude course at better than 240 m.p.h., and Lt. Erhard Milch, in a Dornier DO-17, won the 228 mile race for multi-seater planes with an average speed of approximately 230 m.p.h. All of this indicates a need of financial stimulation if American designers of planes and engines are to push closed course speeds much above the 250 m.p.h. mark.

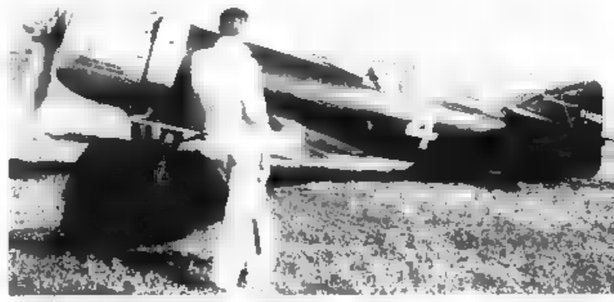
On the credit side of the ledger we have the new records set by Frank Fuller in the Bendix. His times there are all the more remarkable as he is a gentleman flier who has never flown for anything but sport to the best of our knowledge, and so must be given added credit for his fine showing. Also, the Seversky plane which he flew was of standard service type and it is to be supposed that the average Seversky in the hands of the average pilot would be able to duplicate Fuller's record, which speaks well for the calibre of planes now being used by the American Air Service. Had Turner flown the Bendix his specially built Meteor might have given the Seversky [redacted] race. Yet Ortman, with a plane rated much faster, ran second to Fuller largely because his stripped down racer brought him in very "woozy" on account of heat and fumes, having contributed to considerable time lost in navigating. This again confirms the fact that pilot comfort cannot be too greatly sacrificed [redacted] the interest of pure speed.

Perhaps most significant from the powerplant standpoint was the fact that in the Thompson Trophy an inline powered plane took first honors for the second year in succession. In fact every closed course feature race this year, including the Amelia Earhart Trophy Race for women, was won by planes powered with the Menasco in-line engines which have demonstrated their mettle during the past seven seasons of racing. While Wittman led most of the Thompson race, and Turner looked like a sure winner after Wittman dropped back, whatever troubles Wittman and Turner experienced should not detract from the honest victory turned in by Kling.

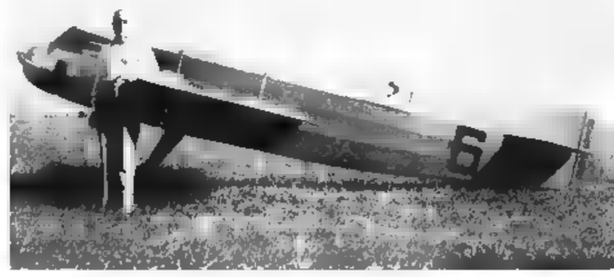
(*Turn to page 76*)

Photos by AVIATION

Al Menasco flashes his victory smile as Kling roars home in front. (Below) Kling's Folkerts Speed King champing at the bit before the Thompson.



Earl Ortman guns his Pratt & Whitney Twin-Wasp Jr. Rider racer just before starting the race he almost won.

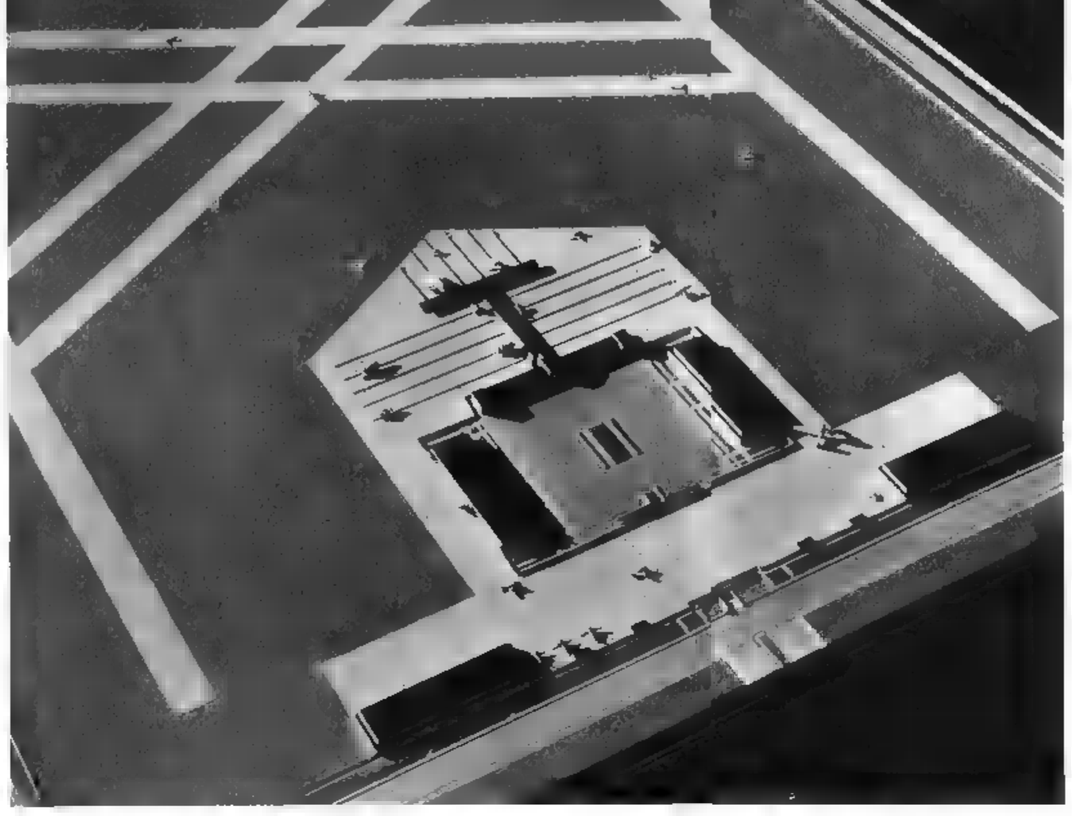


Steve Wittman with the Curtiss powered Wittman Special that led the Thompson Trophy field for seventeen laps.

Frank Fuller's Seversky which [redacted] the Bendix Race and placed in the Thompson Trophy.

The concluding article in a series of three on comprehensive airport planning.

By John Weller Wood



Photograph of a model of the Wood Airport System. (Patented: U. S. A., 1933; Canada, 1933; France, 1933; Great Britain, 1934.)

III
A Solution of the Problem

AN AIRPORT PLAN*

ALTHOUGH RISKS IN FLYING are constantly being reduced by the perfection of aircraft motors, structure of aircraft and improved instruments, the risks incidental to operation about airports are steadily increasing owing to congestion due to the increase in the number of aircraft. As the available land in and near the larger cities and towns is obviously limited, a serious problem confronting the industry is to provide improved airports for accommodating economically these increases in traffic with, at the same time marked reduction in risk.

The following airport plan constitutes an attempt to establish ■ basic standard to which, with necessary modification to suit local conditions, airport forms, and the circulation provided for air and surface traffic are *merely illustrative* and will of course vary in accordance with the airport land available and other local considerations. The basic principles of this layout, hereinafter for brevity called the Wood System, are sufficiently flexible to permit their use, with the necessary modifications, on airports of various shapes provided they approach ■ square, ■ circle or any other relatively compact shape, ■ shape towards which the average airport tends, and provided the airport has sufficient ground area for that category of air transport operation for which it was built.

It should be emphasized that the plan shown in Fig. 1 illustrates the complete final development for the accommodation of the maximum ultimate traffic density consistent with safety, ■ volume which ordinarily would not be reached for some time.

Figures 2 to 5 inclusive illustrate design and construction may be approximated.

To explain the basic principles of this airport layout ■■■ of its special features are illustrated ■■ the accompanying plan, see Fig. 1. The airport shown comprises an area of 640 acres or one square mile. It should be emphasized that the particular configurations of the plans shown in Fig. ■ to ■ inclusive, the runway layouts, the airport buildings, the loading plat-

the possible stages of growth of the Traffic - Control Airport - Expansion Plan from the initial airport facilities consisting of only one hangar and single runways to the ultimate development of the fully expanded airport.

It will be appreciated that the first stage of development of the Wood System is no more costly than the construction of the first stage of any other airport layout—in the long run this system of airport planning will effect substantial saving since by its use no moving of runways or moving or tearing down of existing building will be necessary.

Figures 6 to 9 inclusive illustrate the system of through plane traffic and terminal plane traffic circulation used in this plan for the various wind directions. In the latter diagrams it may be noted that taxiing of loaded planes is reduced over that prevalent at the average airport while at the same time the cross circulation of plane traffic has been eliminated.

When the flight requirements have been adequately met at an airport, re-

(Turn to page 74)

* The basic principles of this plan have been patented in the U.S.A., Canada, England and France

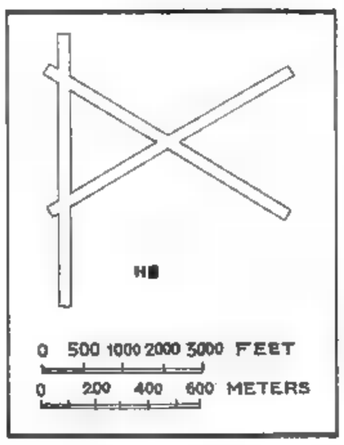


Fig. 2. First Stage

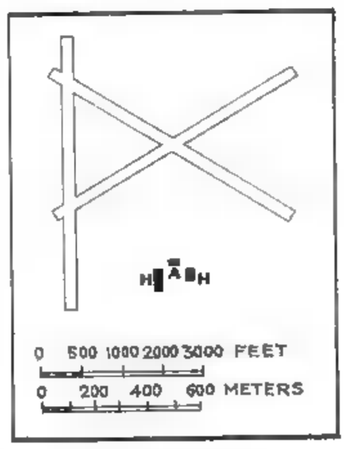


Fig. 3. Second Stage

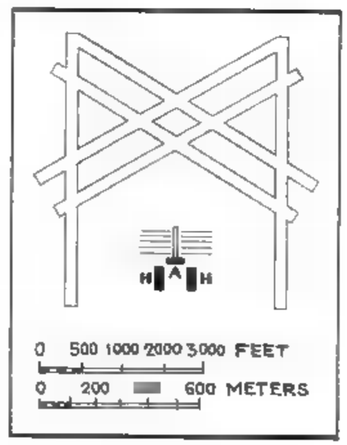


Fig. 4. Third Stage

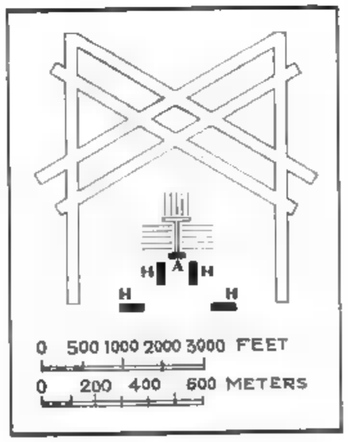


Fig. 5. Final Development

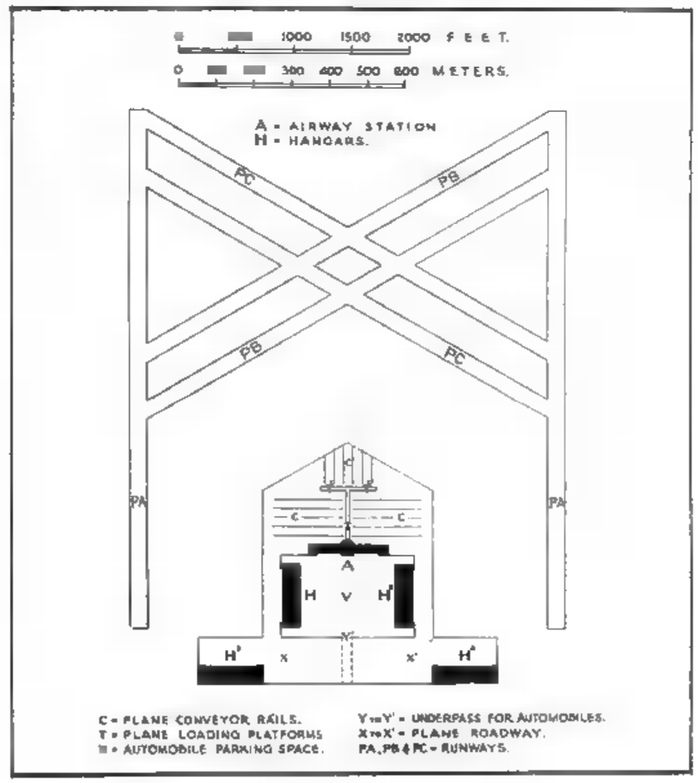
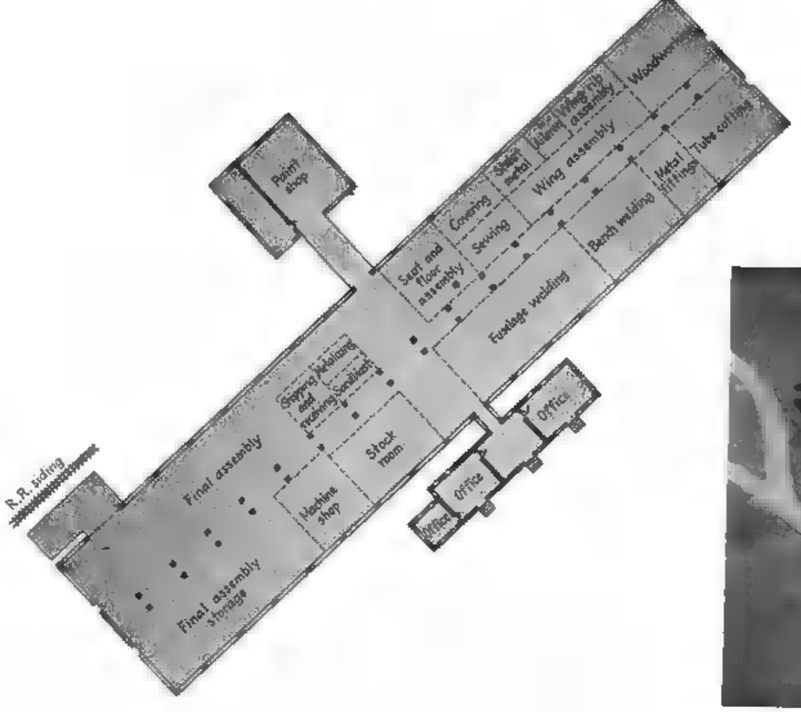
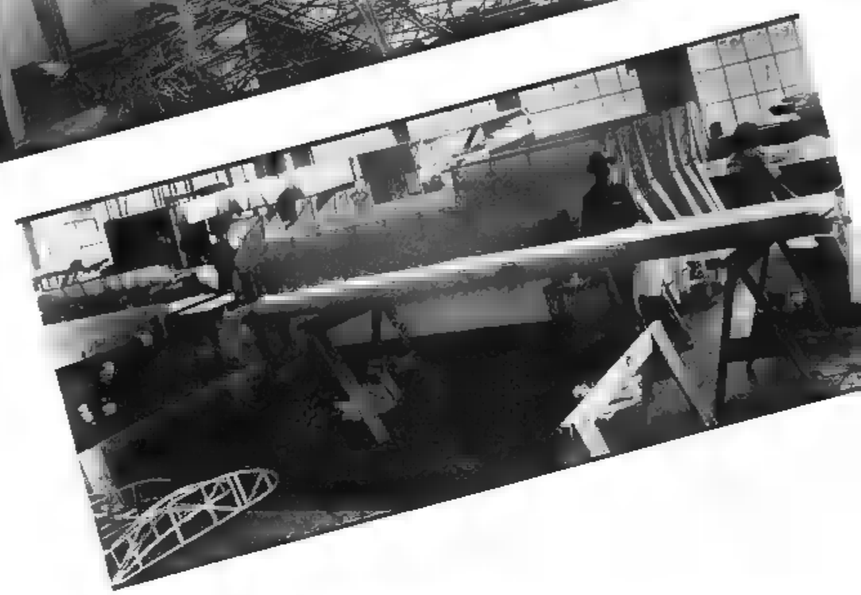


Fig. 1



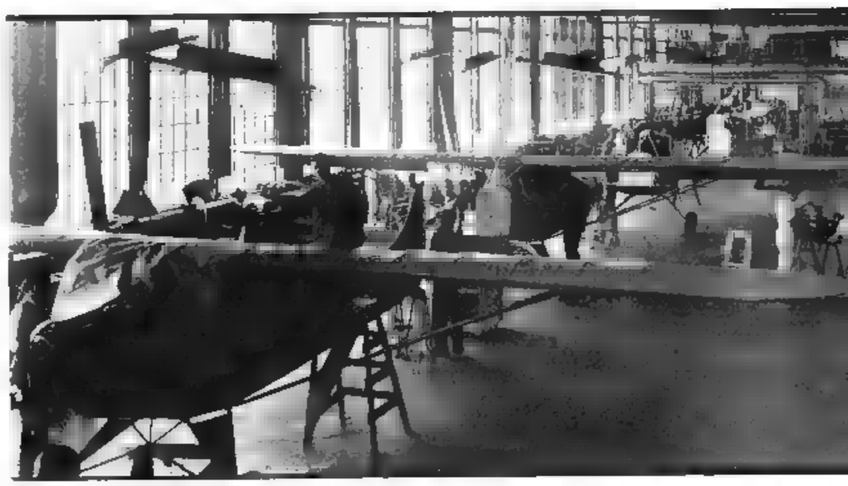
Five a Day

Is the present production rate of Taylor Aircraft but that is only a small fraction of the new plant's potential capacity



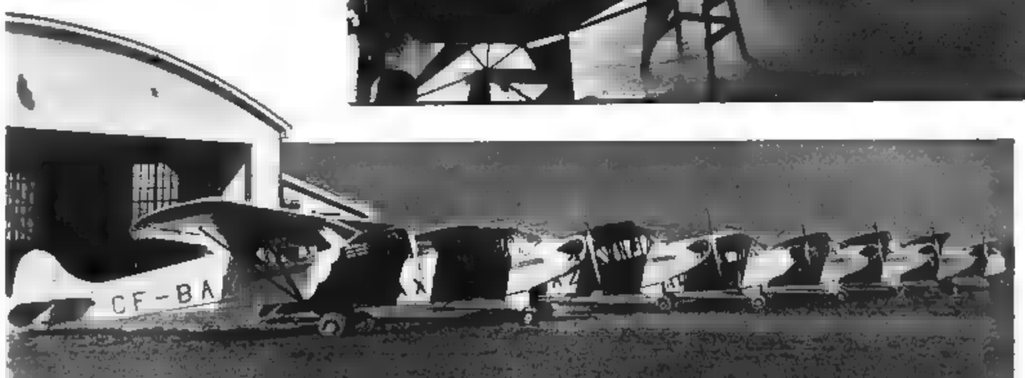
Above: (Foreground) Repair department. (Center) Tool and die shop; supply department. (Background) Fuselage and metal fitting department.

Right: Covering department on the wing side of the production line.

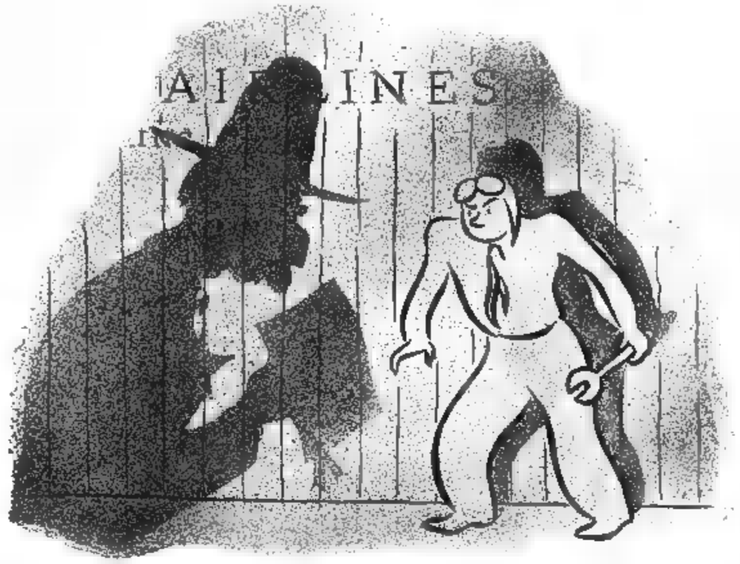


Right: Where wings and fuselage lines merge in final assembly.

Below: Cubs ready for flyaway delivery.



Here the steel tube material starts on ■ way up the fuselage side of ■ parallel production line.



How an aviation department store offering any kind of service any time was built from two empty hangars and a defunct airline.

Chasing the SHERIFF

By Richard M. Love

President, Inter-City Airlines, Inc.

THE TIME is a busy Sunday afternoon at Boston; a phone rings. "The exhaust manifold on my ship has just let go and I am right in the middle of week-end flying. What can you do for me?" comes the query over the wire. This time it is from a man on the Cape.

"Give us thirty minutes, Mr. Smith, and we will locate one of our mechanics who is on call to reweld your stack," is the prompt answer, and we add, "you know our shop is regularly closed on Sundays." If it were practically any other service business in the world Mr. Smith would simply have heard the periodic buzzing one usually hears when the other end of the telephone is not picked up. In this and in every possible case, the mechanic is located, the shop opened up, and the job done—why? Because more is required of the Aviation service companies being what they are, than most any other business today. A fixed base operator must struggle to bring in every dollar and make every friend he possibly can.

Inter-City Airlines, Inc., at Boston, is set up on just such a premise. Four years ago it found itself a defunct airline with two very large and handsome hangars as its chief asset. These buildings were of fine construction and beautiful appearance, but contained very little in the way of work and practically nothing in the way of equipment. With all the assurance in the world at such a slack period, the management decided to blossom forth in the business of repair and overhaul of privately and commercially owned aircraft. At that time it was decided that operations, that is, flying, were much too risky; sales required too much additional capital. We had in mind simply a super-service station. I think little need be said of the futility of such a plan, with the service volume existing in New England at that time. One by one the other operations came in. Before we knew it, we were agents for a well-known type of ship; then another; then another. We had some equipment left over from our airline activities. We found this being chartered on occasion. We were slowly drawn into flying. Our Curtiss hangars had contained the remains of an old stock which we took on consignment. We found in selling this out that it was necessary to replace certain articles, to keep the goodwill of our customers. A parts and accessories store grew up. As a result, we eventually became a "Jack of all trades," and frankly not very much of a master of any.

The next step in our growth came when we were brought to with a sudden bump and made to realize that we simply were pouring money down the sink by operating this tremendous and comprehensive business without taking in any money. The morale of the organization was difficult to maintain due to not having this volume. A constant cash requirement existed and in the height of the depression it looked as though it was absolutely futile to go on. The turning point came when we were brought to and realized that to get money one must spend it judiciously and wisely. We began to advertise; we began to concentrate on sales. We hired personnel to bring our name before the general public in New England, who had heard very little of us since we had stopped running an airline. What's more, we felt we had enough vision to see a potential volume coming. In 1936 it started to come.

COUPLED WITH the approach of a real interest in private Aviation in New England came better selling policies by the leading aeronautical companies, ones which we could depend upon when we made the investment of a distributorship. Our plant slowly began to take shape as the recognized Aviation center, and the increasing amount of volume brought up more assurance in "snowball fashion." Today we are able to take care of the man on the Cape whose stack has broken on a Sunday afternoon, because we are now amply manned in every department. We find people willing to spend when they can get dependability.

Our organization today is composed of a personnel of some fifty-one at the present writing. We have five departments engaged in the operation of selling and one administrative department concerned chiefly with bookkeeping and accounting. We are set up not as the average hangar by the roadside, but as a growing business concern. This is justified only by the volume which has brought about similar concerns in the southwest and on the west coast.

The Operations Department now includes a Government Approved School, a line of fifteen ships not of 1929 and 1930 vintage, but ships produced within the last few months. Fully half of our flying equipment is less than six months old. We maintain a regular pilot personnel of five and will fly between five and six thousand revenue hours this year in both land and seaplanes. Charter work is included in this department, as well as that student flying done outside the approved school, and regular ship rental. We believe that by actual comparison of figures that we do more "U-Fly-It" business than any other organization in the United States.

Many and varied special services are rendered in our flying activities. We flew over one hundred hours of high altitude mapping work last year for the Harvard Institute of Geographical Research. The graduating class in the Aeronautics Course at the Massachusetts Institute of Technology flies individually with our regular instructors as a prescribed part of their curriculum. Flying clubs whose activities are centered in our operations department include the Harvard Flying Club, one of the oldest and best known in the country; and the Staff Flying Club of M. I. T., which, as its name implies, is composed of members of "Tech's" faculty. The separate individuals hiring our ships to pilot either dual or solo exceeded five hundred in number during the first six months of 1937.

Our Service Department has a total personnel of between twenty-five and thirty, depending on the volume of business. Its backbone consists of vet-

(*Turn to page 70*)

After taxiing onto the carriage the seaplane is towed up the ramp by a winch.

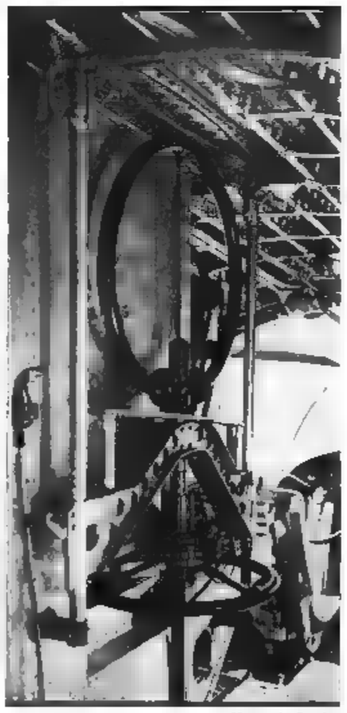
When the carriage leaves the water an attendant takes charge, steering the carriage.

The carriage is driven to and from the shop by the airplane propeller. (See page 70)

By John H. Millar
A.R. Ae. S.I.

RADIO on the Empire Routes

Constant communication with its flying fleet is an essential element of Imperial Airway's far-flung system



Marconi, London

Details of the loop antenna, shown here retracted into the ship. Loop is 19 in. in diameter, projects 25½ in. above the hull (when extended), weighs 12 lb.

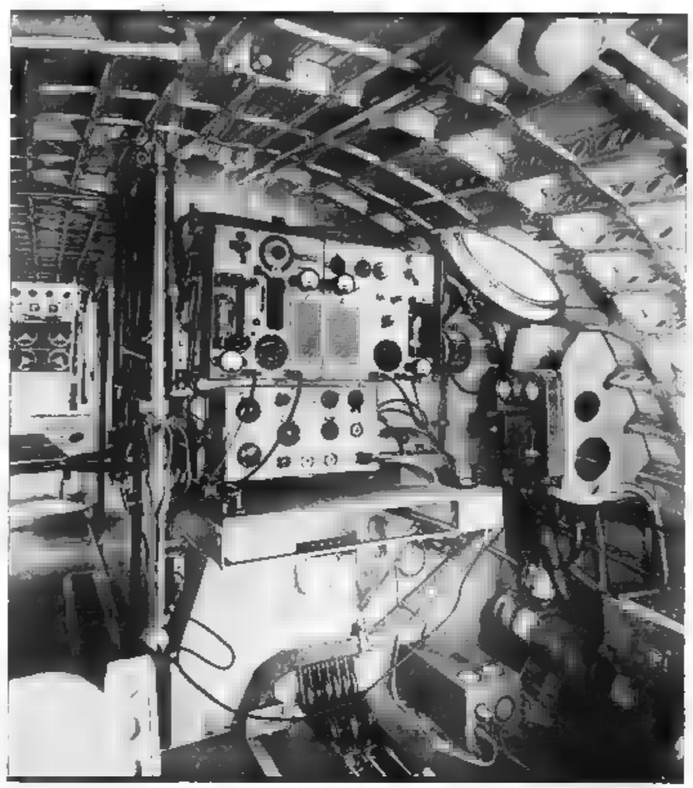
ALONG THE EMPIRE ROUTES wireless stations are being planned to provide 2-way radio (telegraphy) for weather reports, direction finding (D.F.) and homing on medium waves, and 2-way telegraphy on short waves principally for long distance communication. (See also Britain Bids for New Airways, AVIATION, *February, 1937.*)

Weather reports will be sent out principally on short waves. For D.F. work and taking bearings the Adcock system will be used on the medium waveband. All radio stations on the Empire route are being equipped on the Adcock principle and existing Bellini-Tosi ground stations being converted to Adcock.

The Adcock principle has certain advantages over the Bellini-Tosi system as bearings can be taken by night or by day with little fading effect. Ground station aerials are arranged in the form of a square, the four 100 foot metal masts standing at the corners, a fifth aerial is suspended in the centre for non-directional reception and "sense" indication. [Similar antenna arrangements are used on U. S. radio range stations.—Ed.]

Average distances flown are around 500 miles with the exception of the Atlantic and one or two other services. While continuous communication with ground stations is not required it must be possible to get in touch and to keep in touch at any time.

Cooperation between Imperial Airways and Marconi has produced transmitting and receiving equipment now standardised for ground stations and airplanes. Ground stations will transmit continuous wave (C.W.) telephony or telegraphy or interrupted continuous wave (I.C.W.) telegraphy in the medium waveband—600 to 1,500 meters—through the Marconi T.A.9 transmitter 1.4 kw. The Marconi T.A.8 short wave transmitter will be used for the 15-100 meter band with antenna input on C.W. telegraphy of 250 watts. Instantaneous changing to any of four preselected wave lengths is possible with the T.A.9 Transmitter, and to any two wavelengths with the T.A.8.



Marconi, London

Radio operator's post on the bridge of I.A. Empire boat. Top panels house the two transmitters (see text). Below, the two receiver. Power supply is below operating table to right. Retractable loop antenna at left.

Signals at ground stations are received Marconi-Adcock D.F.G.10 medium wave and D.F.G.12 short wave direction finding receivers.

Boat equipment

Flying boats on the Empire Service will all carry 2-way radio, two transmitters and a dual wave receiver.

The transmitters are operated independently but are housed in one duralumin case mounted about 3 feet behind the pilot to leave space for the radio operator. Each section of the transmitter is complete in itself as far as tubes, master oscillators, power amplifiers, feed meters and switching arrangements are concerned, and cover a medium waveband of 600 to 1100 meters (500 to 270 kcs) and, in the short waveband 16.9 to 75 meters (17,750 to 4,000 kcs). In the medium band, telegraphy can be transmitted on C.W. or I.C.W., or telephony can be used on C.W. Actually, it is intended to use C.W. telegraphy almost exclusively throughout the Empire Service because of greater freedom from jamming and heterodyning. The short wave transmitter will be used for C.W. or I.C.W. telegraphy only.

The range of the medium wave transmitter from ship to ground using approximately 66 watts in the aerial will be from 200 miles with telephony to 400 miles with C.W. telegraphy. The short wave transmitter can be heard many thousands of miles depending on the frequency chosen, time of day and time of year.

A combined medium and short wave superheterodyne receiver covers 15-75 meters and 600-2000 meters with D.F. The receiving sets with which all ships on the Eimpire Service will be equipped with a "break-in" feature. The radio operator is able to hear signals from the ground station while he is actually sending a message, or rather, while the transmitting key is not actually being pressed. In other words, the receiver can be left on, tuned in and connected to aerial while the transmitter is being worked. In the ordinary way the receiver would be disconnected from the aerial while the operator was transmitting, and the ground station would have to wait until the ship had finished transmitting and changed over to receive before any instructions could be put on the air. "Break-in" is accomplished by connecting the receiver during telegraphy transmission to a small dipole aerial, which is shorted only while the key is actually being pressed.

Direction finding

The Empire Boats are self contained as far as D.F. requirements are concerned, as the operator can take bearings on ground stations or even on ships at sea. A screened loop aerial, 19 inches in diameter, on a retractible mounting which enables it to be pushed up through the roof of the pilot's compartment, is rotated by a hand wheel fitted with an azimuth scale from inside the radio cabin. (See illustration.) When the loop is set at right angles to the line of flight, "homing" on a ground station is possible and a "left-right" indicator on the instrument board enables the pilot to see at once if he is off course. A phase coupling reversing switch is provided when the open aerial is used with the loop for homing, and off-course indication can be detected aurally to within plus or minus 2 deg. and plus or minus 3 deg. with the visual indicator.

Power supply

A dynamotor taking 27 amperes from the ship's 24 volt batteries generates 12 volts low tension for the tube filaments and 1200 volts high tension for the transmitter. Two generators are fitted to two of the four Pegasus motors, but if it is necessary to re-charge the batteries when the engine driven generators are not in use, a 1 hp. Marconi-Stanley 2-stroke gasoline engine can be coupled to the dynamotor. For starting the 2-stroke, current from the batteries is run through the 24-volt motor side of the dynamotor, and when running, the motor becomes a generator and delivers 390 watts at 26 volts 15 amps. High tension supply for the receivers is provided by an anode converter

(Continued on page 75)

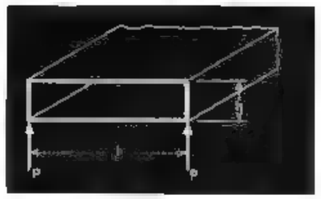


Fig. 1 Typical box beam

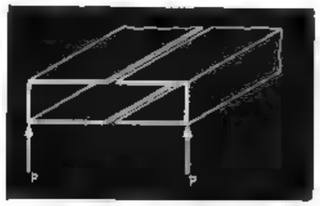


Fig. 2 Split box beam

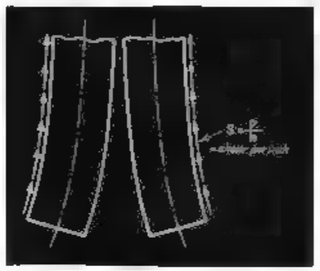


Fig. 3 Upper flanges of split box beam

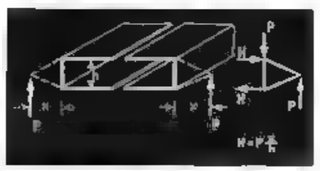


Fig. 4 Split box beam with load applied outside of webs

An old engineering trick provides a new approach to the problem of

Box Beams and Shear Lag

By F. B. Shanley

Consolidated Aircraft Corporation

THE OLD ENGINEERING TRICK of cutting something in two and then finding out what is needed to bring it back together can be used to throw some light on the box beam problem and may serve as a new method of attack on "shear lag". Fig. 1 illustrates a typical case of a box beam with two concentrated shear loads applied at the shear webs. What happens if we split it lengthwise as shown in Fig. 2? If we isolate one of the upper flanges it will look something like Fig. 3 and will act as a column loaded on one edge. It is assumed that all axial stresses due to bending are taken in the flanges, a condition usually closely approximated in wing beams. The eccentric shear loads will produce bending moments tending to *separate* the two upper flanges. The opposite will, of course, be true for the lower flanges: they will be forced together. This shows that the box beam of Fig. 1, when loaded at the shear webs, will have transverse tensile stresses in the top (compression) flange and transverse compressive stresses in the bottom (tension) flange. This fact is frequently overlooked in the analysis of transverse frames or bulkheads.

Now we can try to find a place to apply the shear load (P, of Fig. 1) so that these transverse forces will be eliminated. When the box is loaded externally, as in Fig. 4, the flanges will have transverse forces applied as indicated in Fig. 5. If the upper half-flange is to remain straight (Fig. 5) it will be necessary to eliminate all lateral bending moments about its centerline. Take point (N) for example, at a distance (a) from the end of the beam. At this point the bending moment is as follows:

$$M_N = Ha - Sa\ (b/4) \quad \ldots\ldots (1)$$

Substituting for H and S, from Fig. 5

$$M_N = P\ (x/h)a - P/h\ a\ b/4 \quad (1a)$$

For $M_N = 0$, eq. 1a becomes:

$$x = b/4 \quad \ldots\ldots (2)$$

Referring back to Fig. 4, this equation says that for zero transverse stresses the shear loads P must be applied *outside* the shear webs at distances of *one-quarter of the beam width*. Under these conditions the beam could be split longitudinally and nothing would happen to disturb the equilibrium. The value of one-quarter of the beam width could, of course, have been foreseen by anyone familiar with the flexural axis of channels. If the load P is applied at the flexural axis of the half-beam it will (by definition) produce no twisting and hence will not distort the cross section and the split beam. It can easily be shown that the flexural axis of a channel lies at ¼ its width (outside the back of the channel) if the back of the channel is assumed to carry only shear stresses. For channels of constant thickness the flexural axis (computed from beam theory) varies as shown in Fig. 6.

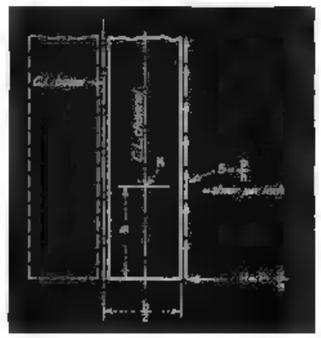


Fig. 5 Upper flange of split box beam with shear load applied outside of webs

("Behavior in Bending of Thin-Walled Tubes and Channels," British Air Ministry R & M 1669, by D. Williams.) This curve can be used to find the theoretical position of the flexural axis for channels having flanges of thickness different from that of the back of the channel. In computing b/h it is only necessary to use a value of flange width b which has been increased in the ratio of flange thickness to back thickness. On this basis it is evident that in all wing box beams the flexural axis of each half will be located practically at the quarter-width point (or one-half channel width).

Shear Lag

The "channel" method of attack helps to clarify the phenomenon of "shear lag" and may even offer a method of attacking this complex stress distribution problem.

If we look again at Fig. 3 we can see that the stress distribution can be estimated from the usual beam theory and will consist of a uniform axial stress plus a bending stress, each flange half being assumed to act

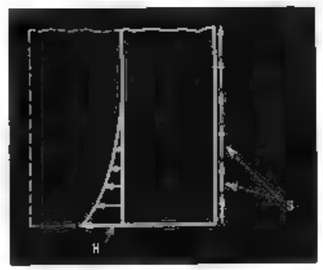


Fig. 6 Flexural axis of channels (uniform wall thickness, constant axial stress distribution in flanges)

independently. Now if the correct transverse force H is applied as in Fig. 5, there will be no bending moment about the centerline of the half flange at any point and the stress distribution should theoretically be a uniform compressive stress. (Actually this will fail to be true to the extent that the classic beam theory does not apply exactly near points of load application.)

If the flange is split (as in Fig. 3) but connected transversely at the end by a single tension tie, the necessary force H will be supplied by that tie as a concentrated load, just as it was previously obtained by locating the shear force on the channel flexural axis. But if the two half flanges are joined together by a continuous tie, as they are *before* splitting, the transverse force H will no longer act as a concentrated load but will be distributed lengthwise in some manner depending on the continuity of the material and the forces required to hold the flange straight. These conditions are indicated by Fig. 7. Under such a system of loads, the bending moment about the half-flange centerline would not be zero at all points, but would be a maximum at the free end of the beam and would decrease to zero at the other end (assuming constant stress distribution at that end and zero restraint). This would give an axial stress distribution picture such as indicated in Fig. 8, in which the stress variation would be linear. We know from actual tests, however, that the true distribution line would be curved (solid line in Fig. 8), which indicates a *secondary* stress distribution effect, probably due to the failure of the classic beam theory to account for shear deformations.

No attempt has been made to solve "shear lag" by this line of attack, as the same ground has already been covered by more formal methods. This method of treating the problem does, however, disclose certain facts: (*a*) Transverse stress will be produced in box beam flanges when the shear loads are applied at any points other than the flexural axes of the two half-beams (channels). (*b*) The usual methods of bulkhead design may be considerably in error if the conditions of item (*a*) are abnormal (such as the use of a very narrow box beam, for instance). (*c*) "Shear lag" might be expected to be least when shear loads are applied on the flexural axes of the two half-beams (about one-fourth of beam width outside of shear webs). (*d*) The presence of a transverse member at the point of load application might be expected to reduce shear lag by making the transverse load more localized in nature. (This effect would be independent of the shear rigidity and would depend only on cross-sectional area.) (*e*) In the "tension" flange of a box beam loaded at the shear webs there will be transverse compressive stresses tending to cause buckling or wrinkling of the sheet. These wrinkles will tend to form along lines of maximum tensile stress and will thereby offer a clue to the action. (*f*) Conditions at the base of the beam (wing centerline) will affect the picture to the extent that the transverse forces required to hold the "split" flange straight will be slightly reduced by the continuity and symmetry of the entire beam. This would appear to increase shear lag slightly over what it would be under the assumption of zero flange fixity. The situation can be viewed also as a case of the effect of end fixity on the flexural axis of a channel. (The channel flanges will actually bend slightly in an S shape causing local twisting, although no twist occurs at point of load application.)

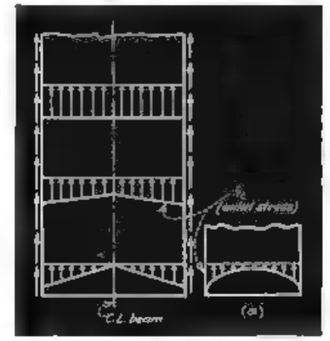


Fig. 7 Typical loading condition for half-flange of box beam (not split)

Although the general solution of the stress distribution for a practical case appears to be too complicated for engineering use, it might be found possible to arrive at a satisfactory answer in many cases by working along the lines suggested here. Further refinements could be made by methods of successive approximation such as the Hardy Cross method of solving continuous frameworks.

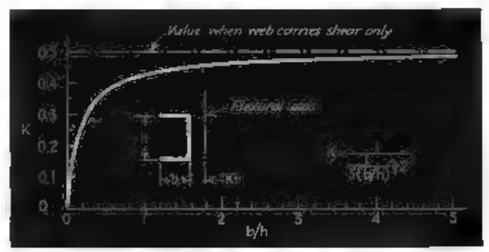
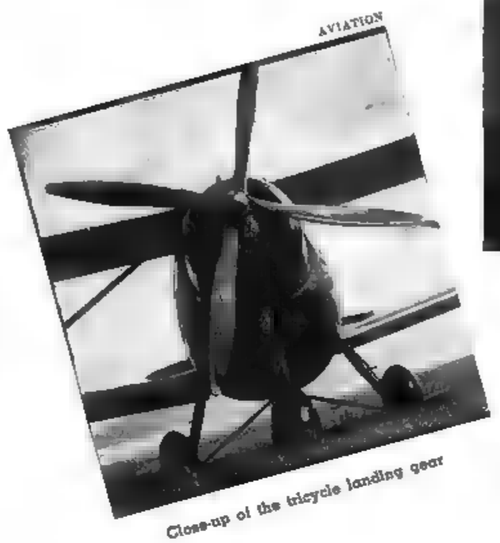


Fig. 8 Approximate axial stress distribution derived from beam theory

Joseph M. Gwinn and his Aircar at the National Air Races

AVIATION



Close-up of the tricycle landing gear

Gwinn Aircar

Veteran Designer Makes New Approach to Problem of the Small Airplane for Private Pilot

REPRESENTING AN ENTIRELY NEW APPROACH to the small plane market, the Gwinn Aircar was first demonstrated during the 1937 Cleveland National Air Races. Designed by Joseph Marr Gwinn, Jr., and manufactured by the Gwinn Aircar Company, Inc., of Buffalo, N. Y., the Aircar introduces a new technique to private flying. Novel features are incorporated from the four blade propeller to the non-existent rudder, for as with the Stearman-Hammond and Waterman planes, the Aircar is essentially a two control craft. Of biplane design and mixed construction, the Aircar presents an anatomical anomaly similar to that of the average small boy with a big appetite, for the overall dimensions are small yet the interior measurements are large.

Featuring compactness for easy storage and handling, the Aircar is a two-place side-by-side seating, close-coupled biplane powered with the Pobjoy Niagara engine and incorporating tricycle landing gear. Wings have a gap of 46.85 in. and stagger of 20.5 in. so there is ample room for large doors forward of the lower wings on each side of the fuselage, permitting easy access to the cabin. Cabin width is 44.7 in. at the seat. Baggage space is ample for a small steamer trunk. Yet the plane has a span of only 24 ft. and overall length of 16.25 ft. Gross wing area is 169.4 sq.ft. and gross weight 1620 lbs. To facilitate repair the fuselage is constructed in seven sections, riveted and bolted. Metal monocoque structure is used throughout the fuselage with 52S aluminum alloy skin and stiffeners and 17ST alloy bulkheads. Solid spruce spars are used in the wings, with aluminum alloy ribs, leading and trailing edges. Fabric covering is cemented to the ribs with dope. Interplane and lift bracing is by means of streamlined steel tube struts. The vertical fin is an integral part of the fuselage structure and incorporates a controllable tab. Aluminum alloy frame, fabric covered, is employed for the horizontal stabilizer. All control surfaces are of thin section with steel tube structure cloth covered. This includes full span flaps on all wing panels and the two elevator halves. All three wheels of the tricycle landing gear are carried on long stroke oleo struts with steel springs to carry taxiing loads. The axis of the front wheel oleo strut is inclined 29 degrees aft of vertical, for steering.

Operating technique of the Aircar has been simplified through a combination of features of tricycle landing gear, two flying controls, and flaps of novel type. The Gwinn flaps are of thin section mounted back of a thick wing, which permits relatively wide changes in wing camber without appreciable change in section drag. It is claimed that the change in lift per degree of flap angle is about 60 per cent greater than with conventional trailing edge flaps so that the work done by the pilot to produce a given change in lift is only about 40 per cent of that for a plain flap. Incorporated in the flap control is a pre-loaded spring which makes it impossible for the pilot to overload the plane by improper use of flaps at any speed. The aileron system coincides with the trailing edge flaps of the lower wings, operating through a coordinated control system, so the ailerons are also protected with the pre-loaded spring. Restricted longitudinal control is accomplished by limiting elevator movement and interconnecting elevator and flap controls so that the design high speed cannot be exceeded, nor can the Aircar be flown at a speed slow enough to lose control.

COCKPIT CONTROLS have little in common with the conventional plane. A wheel is used for control of ailerons and elevator and for steering the front wheel on the ground. Throttle is operated by a foot pedal while taxiing and taking off, and by a set control in the air. Flaps are lowered by depressing the left foot pedal. Flaps are raised and the brakes applied by depressing the right foot pedal.

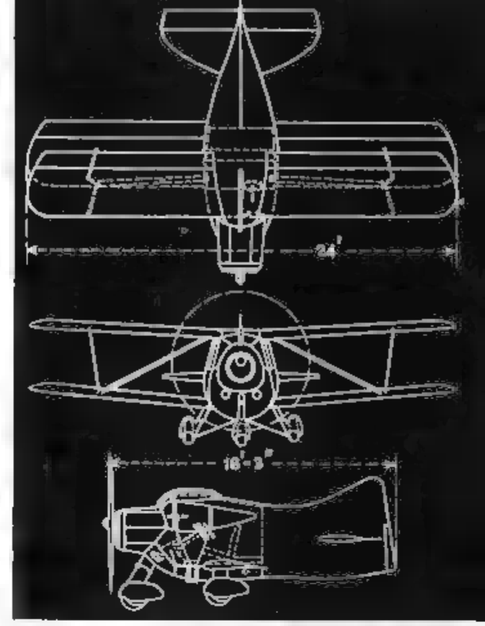
For take-off the plane is brought up to speed while rolling along the ground, flaps up. To take-off, the flaps are depressed. Position of the elevator merely determines the rate of climb. In the air the plane will fly with full load under full control at 41 m.p.h. and can be landed and brought to a stop in about 700 ft. from an altitude of 100 ft. according to the manufacturer. It is claimed that these characteristics make contact flying practicable for the average private pilot under bad weather conditions. In a normal landing the approach to the airport is made with flaps down in level flight, the pilot merely idling the engine upon crossing the field boundary, whereupon the Aircar takes its own glide to reach the ground in level landing position. A unique stabilizer control is graduated in pounds of passengers and baggage and is set prior to take-off, normally requiring no adjustment in the air.

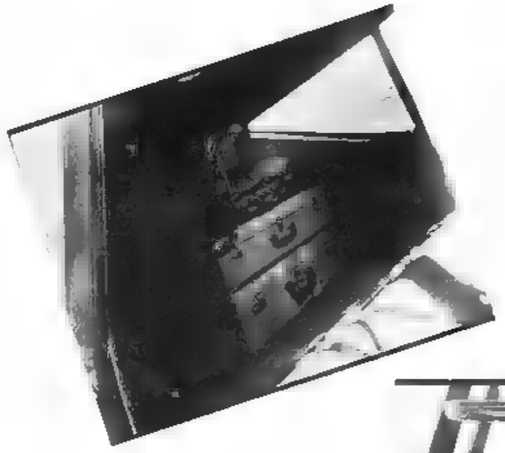
Throughout the Aircar great attention has been given to design for low cost production and also design for minimum maintenance cost and inconvenience. There are no places on the Aircar to oil or grease other than the engine oil tank and shock absorber reservoirs. Noise is reduced by use of a geared propeller of low tip speed, piping of exhaust to top rear of cabin, and careful soundproofing. Forced cabin ventilation and heating is standard, as are headlights and two tone horns. Instrument and accessory equipment is unusually complete, including electric starter, a novel set of large dial instruments, two rear view mirrors, two sun visors, flush type door handles, etc.

Specifications released by the manufacturer are as follows:

Span 24 ft., length 16 ft., total wing area 169 sq. ft. Gross weight 1620 lbs., fuel 25 gallons, baggage 45 lbs. Engine Pobjoy Niagara II, 90 h.p. at 3500 r.p.m. (1640 propeller r.p.m.) Maximum speed 120 m.p.h., cruising speed 109 m.p.h., range 495 mi. Standard Equipment (all included in empty weight). Electric direct cranking starter, 120 watt generator, 36-ampere-hour battery, two headlights with tilt-beam control, position lights, dome light, wood propeller, controlled cabin heating and ventilation, pressure fire extinguisher, "Dunlopillo" seat cushions, sound proofing, map compartment, two sun visors, two rear-view mirrors, two ash receivers, two-tone horns. Instruments: Tachometer, oil pressure gauge, oil temperature gauge, ammeter, fuel level gauge, air speed indicator, altimeter, compass, electric clock.

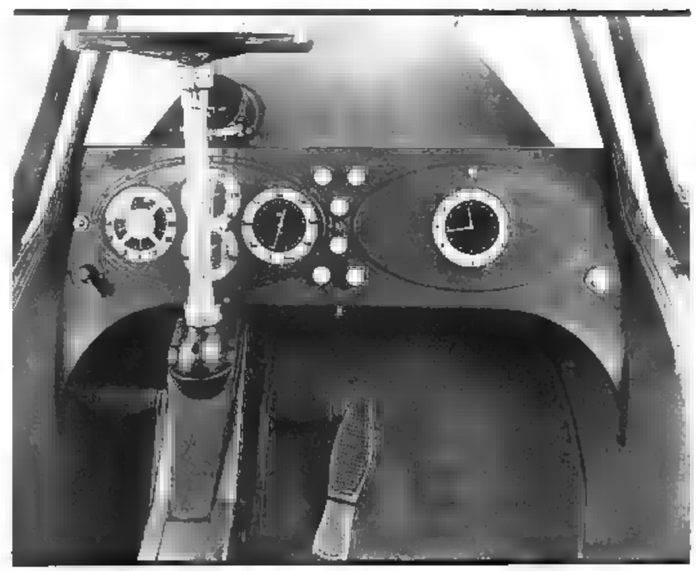
Special Equipment (included in empty weight)—radio receiver with loud speaker.





Above: baggage compartment that holds plenty of bags.

Just like the family automobile is this unusual cockpit with its foot accelerator throttle, and instrument arrangement. Flaps and brakes are controlled by the other foot pedals. The control wheel is shown in the up position which provides easy access to the cockpit.



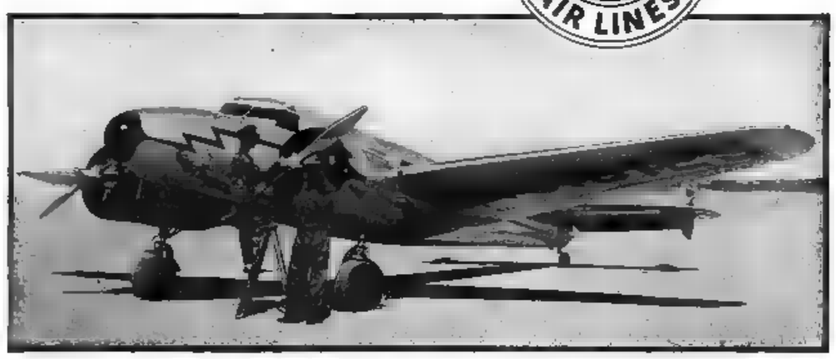
Flying Equipment

"TWO-ENGINE" PERFORMANCE *on* ONE *Engine*

Continental Air Lines' new Lockheed "12" Planes with P. & W. Wasp Jr. SB Engines, rated the fastest airline equipment in the world. Lubricating oil, gasoline, and rocker-arm lubricant . . . all are Texaco.

☆ ☆ ☆

Texaco Asphalt makes resilient, rugged, economical surfaces for airport runways, hangar aprons, driveways, parking areas.



Two-engine ship takes off 7,200 ft. above sea-level
Reaches and maintains 10,000 ft. altitude on one engine

21 Hours of Single-engine Test

Amazed engineers look for ruined engine . . . find parts good as new

WHEN one of Continental's new Lockheed "12s" settled down on the runway at the El Paso Airport, before official observers, airline operators and equipment engineers, she had set a new high for one-engine performance of two-engine ships. She had also written a new chapter in the testing of aviation engines and their lubrication.

Lubricated with New Texaco Airplane Oil, one P. & W. Wasp Jr. SB Engine flew the ship, not for one hour, but for 21 hours . . . in sizzling weather, at high altitudes.

As an example of the severity of these one-engine tests, a single-engine take-off was made noon a June day from the Santa Fe, N. M., Airport, 7,200 ft. above sea-level, with a full live gross load. An altitude of 9,000 ft. was reached and maintained Glorietta Pass to Las Vegas, and as the load was lightened through fuel consumption, 10,000 ft. was reached and maintained. Remember—on *one* engine.

While official observers, airline operators, and engineers freely admitted they had never seen nor heard of such performance, they were skeptical. "Marvelous performance, without a doubt, but at what cost? LET'S SEE THAT ENGINE," was in everyone's thought.

Off with the hottest cylinder . . . Out with the piston and rod. Alert, expectant, wondering . . . could any oil withstand such treatment?

To the astonishment of all, not only was the engine OK, but it showed *no evidence of wear . . . anywhere.*

. . . all rings fell free, cold.

. . . inside of piston was *clean,* free from carbon, free from sludge.

. . . connecting-rod, piston skirt, and flange were also free of sludge.

. . . cylinder-bore was clean, shining; not a worn spot in evidence when checked with micrometers.

Despite the fact that this New Texaco Airplane Oil had been subjected hour after hour excessive temperatures, the oil pressure had remained constant.

Despite the fact that it had been through what is perhaps the most remarkable series of ever recorded in aviation, this New Texaco Airplane Oil was found upon inspection to be unharmed, body and color good.

Trained aviation engineers are available for the selection and application of Texaco Aviation Products. Prompt deliveries assured from 2070 warehouse plants throughout the United States.

The Texas Company, *Aviation Division,* 135 East 42nd Street, New York City.

TEXACO

TEXACO AVIATION GASOLINE ★ NEW TEXACO AIRPLANE OIL FOR ENGINE CYLINDERS AND BEARINGS, SUPERCHARGER BEARINGS AND DRIVE GEARS ★ TEXACO OIL FOR MAGNETO AND STARTER BEARINGS ★ TEXACO MARFAK NO. 2 FOR ROCKER ARMS AND WHEEL BEARINGS

NEW TEXACO AIRPLANE OIL

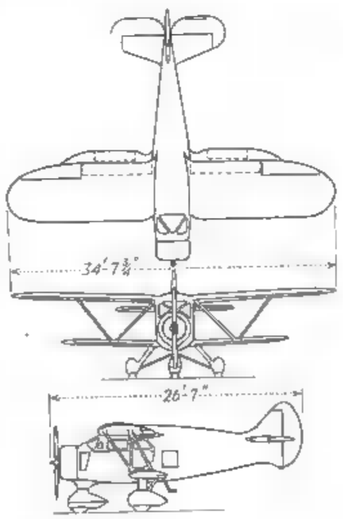
Flying Equipment

Three-Wheeled Waco

Waco of Troy first of old-line companies to adapt tricycle landing gear

Model N demonstrated at Cleveland

One of the surprises in the "fly-past", opening the National Air Races at Cleveland this year, was a ship with familiar outlines, yet decidedly different. It was the Waco N, not yet available in production, but on which deliveries are expected to start late in January of 1938. It is not intended to replace the older C or S cabin series, but will be offered as an addition to the Waco line. The company has been working on the design of a tricycle gear for about three years, and has flown a number of experimental and test models, but the plane demonstrated at Cleveland, was the first representative of the actual production series.

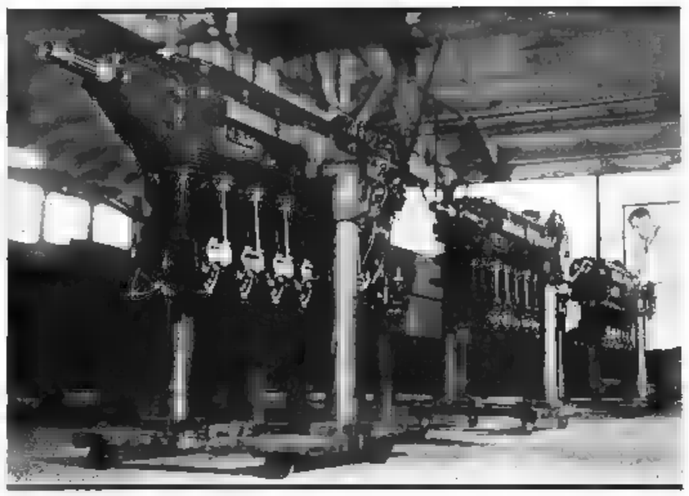


We lost no time in dashing across the field to have a look at the new ship close-up. Fortunately we ran into Hugh Robbins, Cleveland's energetic Waco distributor, who pointed out the fine points of the new job. Full technical details are not yet available, although Hugh Perry tells us that full information covering the technical features will be ready for publication shortly.

As might be expected, the Waco N is not unlike the older Model C in appearance, although it was newly designed and engineered from the ground up and will be built on a totally different set of jigs. Outstanding changes are obvious from the accompanying illustrations. As usual in tricycle landing gears, the center of gravity of the ship is ahead of the rear wheels. Brakes are fitted on the rear wheels only. The little skid (which can be seen below the lower fin) is for emergency use only. According to report, the ship handles well on the ground. Its directional stability is said to be so great at speeds exceeding 15 m.p.h. that either wheel may be braked independently until the wheel slides, without turning the ship until momentum has decreased to a safe turning speed. It is stated that in tests, the Model N has been landed with both rear wheels locked and has simply slid to a level stop.

To reduce landing speed, vacuum-operated trailing edge flaps are a part of both the upper and the lower wings. An automatic pressure limiting device is fitted so that if an attempt is made to glide the airplane with the flaps down at speeds over 90 m.p.h., they automatically close.

The Model N shown at Cleveland was beautifully finished inside in the latest automobile type of upholstery and arrangement. A great deal of thought has evidently been expended on matters of passenger comfort. Dual controls, either of the Y or the throw-over type are available. Brakes are toe-operated from the rudder pedals on the left, and a parking brake lever is accessible from either front seat. Seats, both front and rear, are coil-spring cushioned. Arm-rests are provided all around. A large luggage compartment is provided behind the rear seat which is accessible either from the outside or from inside during flight.



Flying Equipment

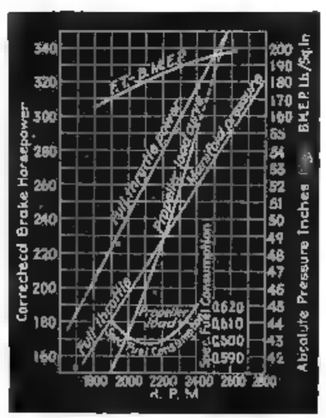
Menasco Engine Incorporates Advanced Features

SUPER BUCCANEER

AMERICAN AIR RACING has frequently served to introduce new commercial engines before their application to more conventional operation. This year the new Menasco Super Buccaneer engine made its bow in the Folkerts Speed King flown by R. A. Kling, and when the tumult and the shouting died away it was noticeable that the Super Buccaneer had the Greve and Thompson victory scalps firmly lashed to the mast. This is a particularly auspicious debut for a new engine model as A. S. Menasco assures us that the engine used by Kling was strictly stock in every respect.

Like previous Menasco engines, the Super Buccaneer is an air cooled inline inverted engine. Designated Model C6S-4, the engine has a displacement of 544 cubic inches, weight of 534 lbs. and manufacturer's rating of 250 hp. at 2,350 r.p.m. at 5,000 ft. altitude, with 290 hp. at 2,400 r.p.m. permissible for take off at sea level. A Menasco centrifugal supercharger with a gear ratio of 10.4 to 1 times crankshaft speed is fitted.

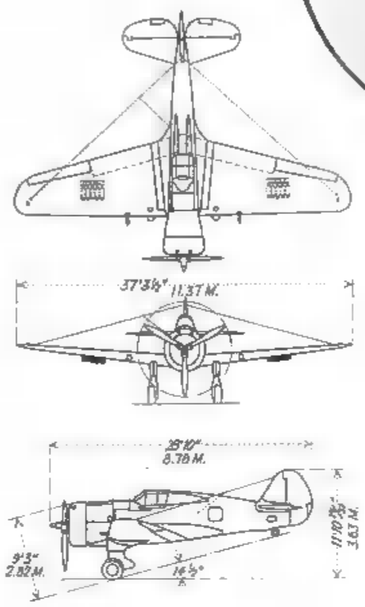
The Super Buccaneer incorporates many refinements developed over a period of years which has included two years of operation on factory test stands and in the air. Among the new features are: twin camshafts; complete enclosure of valve gear; automatic lubrication of entire valve mechanism; provision for hydro control governor for constant speed propeller; provision for a wide range of accessories including starter, generator, fuel pump, air pump, machine gun synchronizers, etc.; steel cylinders with screwed and shrunk-on heads; wide use of forged parts of steel, aluminum and magnesium alloys; new steel-backed cadmium silver plain bearings; extension of crankshaft propeller end to provide improved engine cooling and fairing; and numerous minor refinements. It is obvious that in entering the 250-300 hp. engine field the Menasco company has brought to bear on the design of an engine of this power all of the experience gained in ten years of engine manufacturing and the development of seven different approved type models of inverted inline air cooled engines.



The crankcase is a ruggedly ribbed aluminum alloy casting with all oil lines internal. The six throw crankshaft is carried on seven main bearings with a ball thrust bearing forward of the front main bearing. Crankcase cover, nose section and accessory case are magnesium alloy castings. Cylinders are machined from forged steel billets and are attached to the case by eight short studs. Heads are screwed and shrunk to the cylinders. Rocker boxes are cast integral with the head, with oil tight magnesium bonnets, and duralumin tube push rod enclosures sealed with synthetic rubber rings to prevent possibility of oil leakage. The engine is of dry sump type with a shallow collector sump the full length of the crankcase generously finned for cooling. Pressure lubrication is provided to all main and connecting rod bearings, accessory case, and by gravity to the valve gear. Scavenging is by a triple suction pump which draws oil from the front of the crankcase, accessory case sump, and rocker boxes. It was notable at Cleveland that after three days of racing Kling's engine came in ex-

(*Turn to page 78*)

Flying Equipment



Curtiss Hawk 75

Powerful military weapon by Curtiss-Wright ■■■ available for export.

IN BUFFALO RECENTLY we had opportunity to examine the Curtiss Hawk 75 Pursuit airplane which has just been released for export. This machine was developed from the Y1P-36 of which 230 have been ordered recently by the U. S. Army Air Corps. The Hawk 75 is designed not only for short range, high performance interception and pursuit, but also fitted to operate over a very wide range with full military load as an escort for bombing groups. For example, at a cruising speed of 240 m.p.h. (386 km.p.h.) it will cover 1,380 miles (2,220 km.) at 16,400 ft. (5,000 m.). Reducing the cruising speed to 210 m.p.h. (338 km.p.h.), the range goes up to 1,540 miles (2,480 km.) at the same altitude.

Although the normal gross weight is 5,305 lb. (2,406 kg.), it was shown repeatedly during tests that the machine could take off, fly and maneuver with full military load plus full gas tanks ■ a gross weight of 1,160 lb. above normal.

Power plant is ■ Wright Cyclone SGR-1820G-3 with ■ full throttle rating of 840 hp. at 2100 r.p.m., critical altitude 10,700 ft. (3,250 m.). Take-off horsepower at 2,200 r.p.m. is 875 and cruising horsepower at 1,850 r.p.m., 550.

A Curtiss constant speed, three-bladed propeller is the normal equipment for the Hawk 75. Both manual and automatic controls are available. The propeller may be set to any constant pitch by the manual control, or set to maintain constant r.p.m. by the automatic control. Pitch change is by electric motor in the hub, as described in AVIATION for May, 1937.

The ship is all metal except for the covering on ailerons, rudder and elevators. The fuselage is of a semi-monocoque design with Alclad stressed skin, reinforced by transverse bulkhead, stiffeners and longitudinal stringers. The wing ■ tapered in plan and in thickness (N.A.C.A. 2,215 airfoil section at root, 2,209 at tip). Flush-type rivets are used along the leading edge. The internal structure consists of longitudinal stringers, shear beams, and fore and aft ribs, all riveted to a smooth stressed skin. Split type trailing edge flaps are fitted.

The landing gear is of the single-strut, cantilever type. The oleo strut has an unusually long stroke. Goodrich streamlined tires are fitted.

For armament, the Hawk 75 carries one .30 calibre and one .50 calibre Colt machine-gun mounted in the fuselage firing forward, synchronized through the propeller. Two additional .30 calibre guns may be mounted in the wing panels outside the propeller disk. Bomb racks are installed under the lower surface of each wing to carry ten 25-lb. chemical bombs, or ten 30-lb. fragmentation bombs, or six 50-lb. demolition bombs. Alternate bomb racks may be fitted.

A very beautiful booklet is available to those interested through the Export Sales Division of the Curtiss-Wright Corporation at 30 Rockefeller Plaza, New York City.

Specifications

Overall Span	37.3 ft.	11.37 m.
Length	28.8	8.78
Height	9.25	2.82
Tread	7.23	2.20
Total Weight Empty	3,975 lb.	1,803 kg.
Pilot	200 lb.	90.7 kg.
Fuel (120 U. S. gal.—454 liters)	720	326.5
Oil (9 U. S. gal.—34 liters)	68	30.8
Fuselage Guns (1—.30 and 1—.50 cal. Colt)	174	78.9
Radio Receiver and Transmitter	100	45.4
Oxygen	15	6.8
Signal Pistol	3	1.4
Landing Flares and containers	50	22.7
Total Useful Load	1,330 lb.	603.2 kg.
Gross Weight	5,305 lb.	2,406.2 kg.
Wing Loading	22.45 lb./sq. ft.	109.7 kg./sq. m.
Power Loading	6.31 lb./hp.	2.86 kg./hp.

[With Normal Gross Weight of 5305 lb. (2406.2 kg.)]

Performance

High Speed	238.6 m.p.h. at Sea Level	384.0 km.p.h.
High Speed	280 m.p.h. at 10,700 ft.	450 km.p.h. 3,250 m.
Cruising Speed	240 m.p.h. at 10,700 ft.	386 km.p.h. 3,250 m.
Time of Climb	12.52 min. to 22,960 ft.	7,000 m.
Service Ceiling		31,800 ft. 9,700 m.
Absolute Ceiling		32,800 ft. 10,000 m.

Flying Equipment

Unique features demonstrated in Bendix race

SUNDORPH
Cabin Monoplane

RECEIVING ITS FIRST INTRODUCTION to the flying public in the 1937 Bendix race, the new Sundorph 4-5 place cabin monoplane made an excellent showing. Powered with a 285 hp. Jacobs engine and equipped with Bendix RCA radio compass and Smith controllable propeller, the Sundorph was flown by E. C. Sundorph, designer and builder, with John Yost as radio man. The trip from Los Angeles was made with only one stop—at Kansas City—to finish in sixth place with an average speed of 166.210 m.p.h.

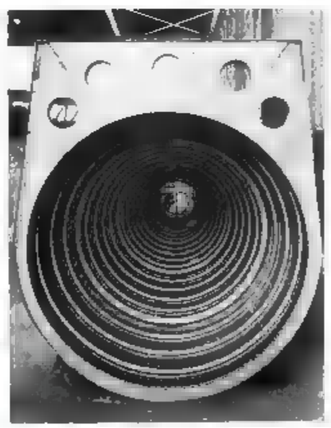
First commercial versions of the Sundorph are to be equipped with the Jacobs 225 hp. engine, although the fuselage has been stressed for engines up to 600 hp.

Of admirably clean design, the Sundorph features a monocoque fuselage of round cross section except at the cabin. Wings, tail surfaces, and landing gear are all of cantilever design. Fuselage is of aluminum alloy sheet structure, with aluminum tube rings drilled to permit riveting the skin directly to the tube. Rugged bulkheads are used at points of major stress distribution, such as wing spar and engine mount attachment. The wing is tapered in plan form and thickness, using two laminated wood spars, wood ribs, and cloth covering. The cabin tapers to a fin which extends along the top of the fuselage into the rear fin proper. Hand operated flaps are provided in the wing, and controllable tabs on the elevators. Particular interest attaches to the cantilever landing gear due to use of the new Firestone Air Spring system for absorbing all landing and taxiing loads. The upper end of each landing gear leg operates against a rubber air bellows which is connected to an air reservoir. Air movement is controlled by a special pendulum valve to provide "soft" landing gear action.

Span 33 ft. Length 29 ft. Wing area 182 sq. ft. Airfoil NACA 2412. Top speed 200 m.p.h. Cruising speed 180 m.p.h. Landing 48–50 m.p.h. Weight empty 1650 lbs. Useful load 1350 lbs. Gross weight [illegible] lbs. Range 700 miles.

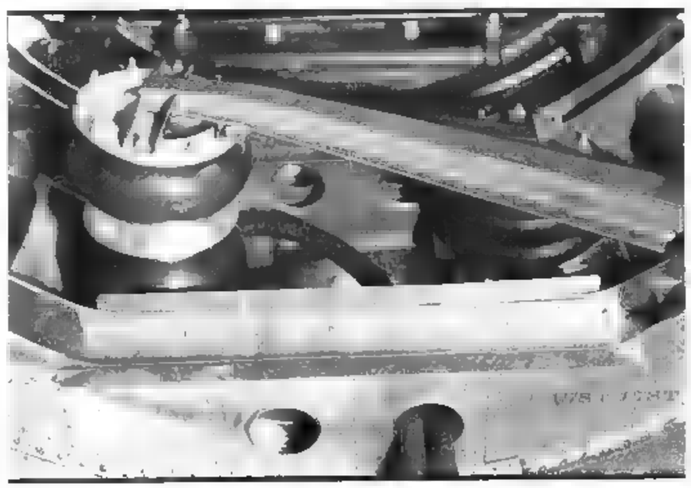
Equipment:

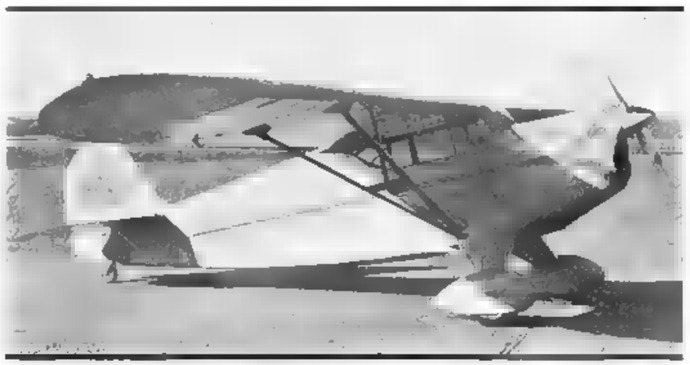
Jacobs 225 h.p. engine, Smith electric controllable propeller, International flares (3), Grimes position lights, Grimes retractable landing lights, General streamline tires, Variety wheels, Aerol shock strut on tail wheel, adjustable seats, sliding side windows, cabin ventilation, Eclipse generator and starter, Dalber compass, Ahrens controls, electric fuel and oil gauge, Pioneer turn and bank indicator and Sperry Gyro and artificial horizon driven by Pesco vacuum pump, Pioneer manifold pressure, sensitive altimeter, carburetor air temperature indicator, vacuum gauge, oil temperature and pressure gauges, tachometer, ammeter and voltmeter, Weston thermocouple. Glidden dope was used. Engineering by F. M. Salisbury.



Above: The fuselage skin is riveted directly to the aluminum tube rings.

Right: The [illegible] Firestone Air Spring system [illegible] shock absorbing.





Rearwin Speedster with Menasco Pirate engine

Rearwin

Companion Plane to Well Known Sporster Approved

DESIGNED to supplement the popular Rearwin Sportster, the new Rearwin Speedster is a snappy little high wing cabin monoplane seating two people in tandem. Full advantage has been taken of the features of low frontal area, high thrust line, and low center of gravity of the Menasco Pirate engine with which the plane is powered. The result is a private airplane for the experienced pilot who wants appearance and performance in a given price class. Available with either the supercharged or unsupercharged Pirate, the Speedster is reported to have a top speed of 163 m.p.h. with the 150 hp. supercharged model.

Fuselage structure is of welded steel tubing, with spruce fairing and fabric covering. Front section of the cabin and engine cowling are of aluminum alloy sheet smoothly contoured and finished in baked enamel. Wings are of wood construction with aluminum alloy leading and trailing edges and fabric covering. Struts are faired into wings and fuselage. Tail surfaces are of welded steel construction with fabric covering. Landing gear is of cantilever type, internally sprung, and has a tread of 72 in. The pneumatic tail wheel is mounted on a full swiveling hydraulic strut shock absorber.

High wing location in conjunction with the in-line engine and tandem seating provides unusual vision in all directions, including directly downward, and directly forward, even while taxiing.

The cabin is carefully upholstered and is provided with sliding windows for ventilation, deep cushioned seats, and ample space for 50 lb. of baggage. Location of fuel tanks in the wings provides gravity fuel flow to the engine in any normal flight position. All controls are mounted on ball bearings, the horizontal stabilizer is adjustable in flight, and the plane is said to fly comfortably "hands-off" from either seat, dual or solo. Dual controls are standard equipment and the complete instrument board is readily visible from either seat.

Specifications supplied by the manufacturer are as follows:

Model	6.000M	6.000MS
Engine—Menasco		
"Pirate"	125 hp. C-4	150 hp. C4S
Wing span	32 ft.	32 ft.
Length overall	22 ft. 2 in.	22 ft. 2 in.
Height overall	6 ft. 8 in.	6 ft. 8 in.
Wing area	143.2 sq. ft.	143.2 sq. ft.
Power loading	13.6 lb. per hp.	11.35 lb./hp.
Wing loading	11.88 lb./sq. ft.	11.88 lb./sq. ft.
Empty weight	1,070 lbs.	1,085 lbs.
Useful load	630 lbs.	615 lbs.
Pay load	220 lbs.	220 lbs.
Gross weight	1,700 lbs.	1,700 lbs.
Fuel capacity	34 gallons	34 gallons
Oil capacity	2.5 gallons	2.5 gallons
Maximum speed	150 m.p.h.	163 m.p.h.
Cruising speed	130 m.p.h.	142 m.p.h.
Landing speed	48 m.p.h.	48 m.p.h.
Rate of climb	800 ft. per min.	1,000 ft. per min.
Cruising range	550 miles	550 miles

Standard equipment includes: Air speed indicator, compass, tachometer, oil pressure gauge, oil temperature gauge, switch, two fuel gauges, tool kit, dual controls, brakes, fire extinguisher, tail wheel, first aid kit, cabin door lock, upholstered cabin and cushion seats, adjustable front seat, engine manual, wiring for position lights, 50 lb. luggage capacity in two compartments.

Special equipment includes: Position lights, wheel pants, special instruments, starter, metal propeller battery.

Babcock

Two place Rover powered ship ready for production

OVER AT Shorty Fulton's Municipal Airport at Akron we caught up with V. C. Babcock and had a chance to fly his ship. The Babcock monoplane is a two place, side-by-side, midwing monoplane with a wood and fabric wing and a steel tube and fabric structure. It is put together with a lot of interesting and thoughtful features. For example, there are pyralin windows in the sides of the fuselage under the wing so you can look below you. The much needed elbow room in small two seaters is provided by leaving the wing root structure open where it bolts to the fuselage.

With full load, the Rover engine (Mr. Babcock knows where he can get more of them) provides plenty of power for quick take-off and rapid climb. The plane is unusually stable about all three axes.

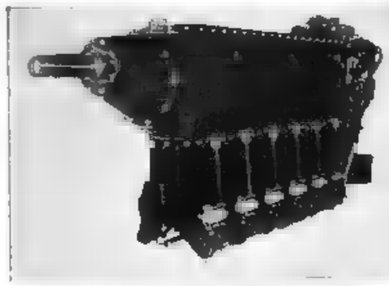
Specifications are as follows:

Wing span	30 ft. 9 in.
Overall length	21 ft. ½ in.
Overall height	5 ft. 9 in.
Maximum chord	5 ft. 9 in.
Minimum chord	3 ft. 11 in.
Wing area (inc. ailerons)	135.44 sq. ft.
Aileron area	14.90 sq. ft.
Horizontal tail area	28.34 sq. ft.
Vertical tail area	13.92 sq. ft.
Wing loading	10.70 lb. per sq. ft.
Power loading	19.33 lb. per sq. in.
Weight empty	948.5 lb.
Useful load	501.0 lb.
Gross weight	1449.5 lb.
Maximum speed	100.9 m.p.h.
Stalling speed	40.0 m.p.h.
Ceiling	10,500 ft.
Range (cruising)	320 miles

Rover powered Babcock Monoplane

256.9 MILES AN HOUR

DEMANDS EXTRAORDINARY BEARING EFFICIENCY



Above: New Menasco 6-cylinder Super-Buccaneer aircraft engine.

Below: Typical Federal-Mogul main and connecting rod bearings which are standard. ,

That's why the Menasco Super-Buccaneer is Equipped with Federal-Mogul Engine Bearings

Powered by the new Menasco Super-Buccaneer 6-cylinder engine, the monoplane piloted by Rudy A. Kling, after capturing the Greve Trophy, hurtled through the air at an average of 256.9 m.p.h. to win the Thompson Trophy in Labor Day's national air races.

Again, torturing speed had emphasized the importance of dependable engine bearings. In the Super-Buccaneer, Menasco uses seven Federal-Mogul steel-back babbitt-lined main bearings and six Federal-Mogul steel-back C-S metal-lined connecting rod bearings. Commenting on the race results, the Menasco Manufacturing Company says: "*. . . we feel that the success of this engine is largely due to the excellent materials which go into its manufacture, such as Federal-Mogul bearings.*"

FEDERAL Mogul

FEDERAL-MOGUL CORPORATION

11031 SHOEMAKER AVENUE DETROIT, MICHIGAN

Instrument DEPENDABILITY

Helps "KLING – SPECIAL" to win

Another test of dependability . . . RUDY KLING in the Menasco-powered "KLING-SPECIAL" equipped with AEROMARINE instruments wins the THOMPSON and GRIEVE TROPHY races . . . Time 46: 42.54. Speed 256.910 m.p.h.

Small wonder that 70% of all American Commercial planes built in 1936 used "AEROMARINE".

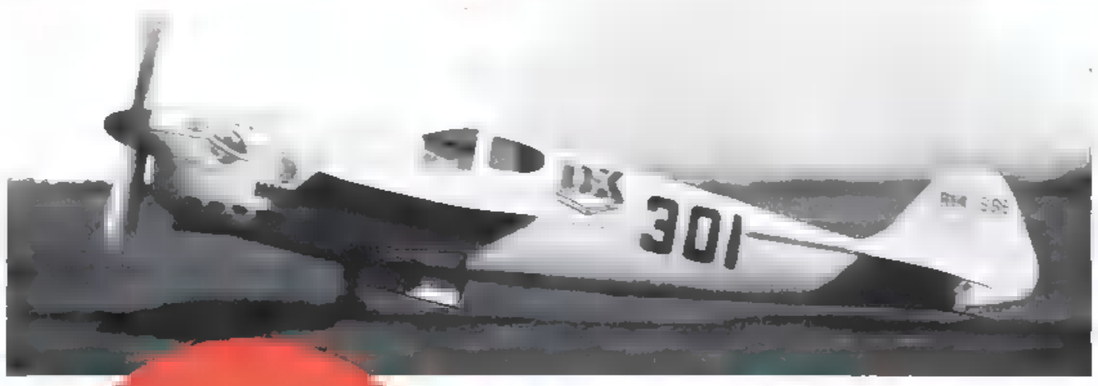
Standardize on the "Dependable Line" of Airplane Instruments.

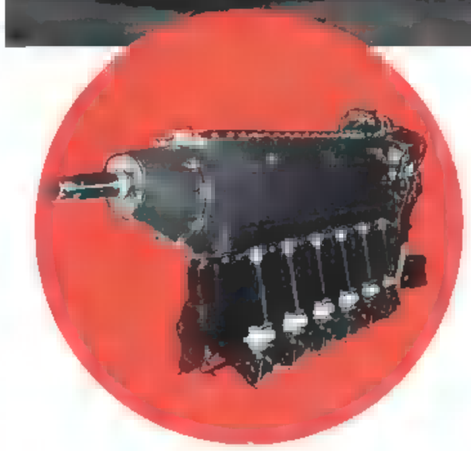
AEROMARINE INSTRUMENT CO., INC.

450 Whitlock Avenue Bronx The Line

Sales representatives: Air Associates, Inc., Garden City, Chicago, Los Angeles

DOWMETAL'S unique and important place as the *lightest* practical metal was dramatically emphasized by Rudy Kling's double victory in the National Air Races. DOWMETAL'S performance in the new Menasco Super Buccaneer engine met every demand for lightness, strength and durability. This important contribution to aviation is but one of DOWMETAL'S many uses by industry.





DOWMETAL

MAGNESIUM ALLOYS

LIGHTEST OF ALL STRUCTURAL METALS

Fifty-five pounds of DOWMETAL are used in this Menasco Super Buccaneer engine that powered Rudy Kling to victory in both the Louis W. Greve and Thompson Trophy Races. 15 pounds of weight are saved by using DOWMETAL for accessory case, crankcase cover, front case covers, tappet guides and many smaller units such as oil pump parts. DOWMETAL'S important saving in weight contributed to the Super Buccaneer's spectacular performance in winning aviation's two most exacting performance feats.

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

Branch Sales Offices: 30 Rockefeller Plaza, New York City—Second and Madison Streets, St. Louis—135 South La Salle Street, Chicago

At the '37 National Air Races . . .

RUDY KLING WINS

with

MENASCO
SUPER BUCCANEER

* * *

First Place in
THOMPSON TROPHY RACE

First Place in
GREVE TROPHY RACE

* * *

MENASCO
SUPER BUCCANEER

is equipped with two

BENDIX SCINTILLA
AIRCRAFT MAGNETOS

Type MN8 ¾ DF

★

SCINTILLA MAGNETO COMPANY, Inc.

SIDNEY, NEW YORK

(Subsidiary of Bendix Aviation Corp.)

You are Invited to Exhibit at the

INTERNATIONAL AIR SHOW in CHICAGO

January 28 to February 6, 1938

* * *

THE exposition will be the first Class A sanctioned show ever held in the United States and the only show of this rating that will be held next year.

It will be staged in the new International Amphitheatre, one of the country's finest exhibition buildings, which comprises six acres of exhibit area in five spacious halls.

A landing runway, approved by the Bureau of Air Commerce, is adjacent to the Amphitheatre. Tracks to which all railroads entering Chicago have access are adjacent to the receiving doors.

Progressive concerns in the industry have already reserved exhibition space. Applications have been received from organizations representing every division of aeronautics. We suggest that you reserve yours early in order to obtain choice locations.

* * *

INTERNATIONAL AIR SHOW, Inc.

MAYNARD W. SCHRYVER, *Gen. Mgr.*,
17 Dexter Park Avenue,
Chicago

Sanctioned by the Aeronautical Chamber of Commerce of America

AGAIN—
Where the Bearings MUST NOT Fail—

MENASCO Employs "NORMA-HOFFMANN" PRECISION BEARINGS

The achievement of Rudy Kling and his MENASCO-powered plane in winning the Greve, Thompson, and Henderson Trophies at Cleveland, is another demonstration of NORMA-HOFFMANN dependability. * * * The 12-cylinder MENASCO SUPER-BUCCANEER engine in Kling's plane was equipped with NORMA-HOFFMANN PRECISION BEARINGS. * * * The Menasco Manufacturing Company, Los Angeles, Cal., writes "we feel that the success of this engine is largely due to the use of excellent materials such as NORMA-HOFFMANN BEARINGS in its manufacture".

NORMA-HOFFMANN PRECISION BEARINGS are used by leading builders, not only of engines but also of engine accessories, planes, control apparatus, radio equipment, aerial cameras, and landing field equipment. Write for the Catalog. Let our engineers work with you.

NORMA-HOFFMANN BEARINGS CORPORATION, STAMFORD, CONN., U. S. A.

PRECISION BALL, ROLLER, AND THRUST BEARINGS

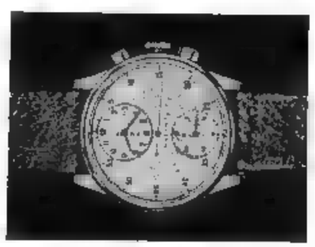
Buyers' Log Book

What's New in Accessories, Materials, Supplies, and Equipment

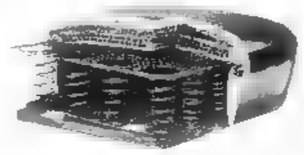
Multi-Chron

Is a watch, a timer, a chronograph and ■ tachometer

ON OUR "MUST" LIST for personal accessories we have placed the new all-purpose Multi-Chron recently introduced by Racine and distributed in the United States by the Johnson-National Insignia Company, 314 West 14th St., New York City. This multi-purpose timepiece was specifically developed for so many different people, including pilots of all types, that one wonders if there is anyone who can afford to be without it. The Multi-Chron is ■ watch, a timer, a chronograph and ■ tachometer, designed to translate time into speed, and speed into time. The basic mechanism is a fifteen-jewel Gallet movement embodying a Nivarox hairspring and Glacidur metal balance wheel which are rust resistant, non-magnetic and not susceptible to temperature changes. The case is of Firth Stabrite steel, and the dial, incorporating three dials and five sets of figures is actually easy and convenient to read. Available in one or two button models, the former stopping, starting and returning the sweep hand with the same button, while on the two button model one button serves to start and stop the sweep hand, the second button returning it to the zero position. One portion of the dial is devoted to the regular hour and minute readings, which appear in black figures. The outer circle indicating fifth seconds is also in black figures. The large sweep needle makes one revolution in 60 seconds and a small counter needle records the number of revolutions of the sweep hand up to 30 minutes. A set of red figures on a series of circles graduated toward the center of the main dial show speeds of objects traveling at rates varying from more than one mile per minute through ½ mile per minute or less than ½ mile per minute.—AVIATION, *October, 1937.*



One of the two Multi-Chron Models



Goodrich Spring Covering

Spring Covering—

For upholstered seats developed by Goodrich

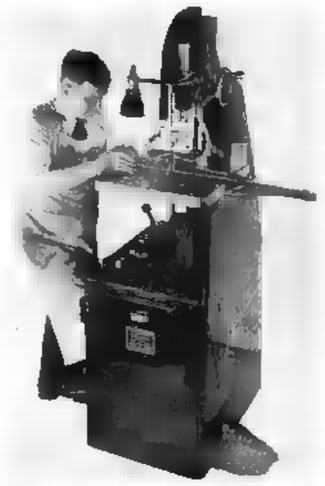
A MATERIAL of universal interest for aircraft cabin furniture upholstering is Nukraft, an elastic spring covering for upholstered seats developed by the B. F. Goodrich Company of Akron, Ohio. By dipping sterilized hair in latex and forming it into loops a spring covering material is evolved which will remain resilient for an indefinite period, literally bridging the gaps between the springs of the cushion over which Nukraft is used. It is claimed that by the use of Nukraft between the springs and fabric seat covering, with a thin layer of cotton, no bumps or unevenness will develop for the life of the cushion.—AVIATION, *October, 1937.*

New Attachments

Additions Made to Continental Doall Machines

NEW ATTACHMENTS now available for the versatile continuous sawing or filing Doall Machine manufactured by the Continental Machine Specialties, Inc., Minneapolis, Minn., provide for power feed of work in the machine, accurate circle cutting, and magnifying glass for intricate precision work.

Of special interest is the power feed which is operated by a heavy coil spring power unit which provides continuous steady feed of the work against the saw or file, with full freedom of work manipulation by the operator. The normal "pull" is 50 lb. but this may be varied or instantly released by means of a foot pedal, leaving the operator's hands free to guide the work.—AVIATION, *October, 1937.*



Continental Do-All Machine with power ■ attachment

Processed Rubber—

Many features claimed for "Rubatex"

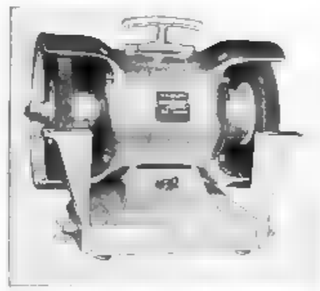
PROCESSED IN AN ENTIRELY NEW WAY, a new commercial form of rubber is now available and should find wide application in the aviation industry. Developed by the Virginia Rubatex Corporation, Bedford, Va., it is related to products known as "sponge" rubber, but has a number of points of difference. Chief is the fact that Rubatex is processed under patents covering introduction of nitrogen into the pores of the rubber. This is done by impregnating the uncured rubber with nitrogen under great pressure and then releasing the pressure to permit the nitrogen gases ■ form millions of tiny bubbles within the rubber, after which it is vulcanized and so permanently ■ tains its unique "softness". It is claimed for Rubatex that it is unusually soft, waterproof, buoyant, vermin proof, long lived, sanitary and of special value as a heat insulator or vibration dampener.

The material can also be supplied in ■ form which is hard as a board and extremely light in weight, averaging from five to twenty pounds per cubic foot, as desired. This is lighter than either cork or balsa. Rubatex is already finding application in the aviation industry for use in soundproofing blankets, vibration dampening, gasketing, and other uses.—AVIATION, *October, 1937.*

Low Cost Grinder—

Black & Decker offers new portable unit

A PORTABLE BALL BEARING BENCH GRINDER by Black & Decker Mfg. Co. Towson, Maryland, offers features of larger and more expensive units at ■ very low price. Powered by a constant speed Black & Decker motor of ¼ hp., the grinder may be bolted to the bench or easily moved from place to place in the shop by means of an integral carrying handle. Generous wheel guards are provided and ample room is allowed for fitting wire wheel brushes. Standard equipment includes one fine and ■ medium wheel, each of 6 in. diameter. Total net weight is 31½ lb.—AVIATION, *October, 1397.*

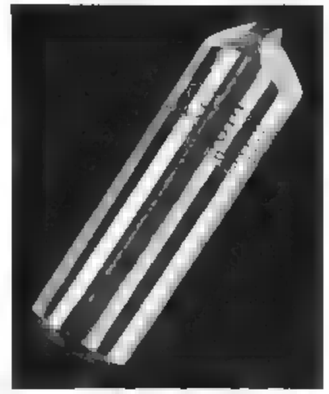


Black & Decker bench grinder

Diamond Tool—

Bores 200,000 pistons before reshaping

NUMEROUS precision finishing operations in the manufacture of aircraft engines and instruments are performed with diamond boring tools. It is therefore interesting to learn of the production record of a Koebel Diamond Tool used on an Ex-Cell-O boring machine in making the finishing cut on the wrist-pin holes of aluminum alloy pistons. The point of this diamond, weighing less than one-half carat, bored more than 200,000 pistons before being reshaped. Total length of "hole" bored was approximately twelve miles and total length of chips removed was more than nine thousand miles, operation dimensions being held to an accuracy of .00015 in. The diamond tool required only re-lapping to the correct radius to prepare it for ■ similar period of production life.—AVIATION, *October, 1937.*



Koebel Diamond Tool

Upholstery Cleaner—

Combination vacuum cleaner and scrubber

DEVELOPED PRIMARILY to clean automobile upholstery, a new Black and Decker "Lectro-Kleen" process should meet with favor in airline shops for quickly cleaning cabin upholstery. Incorporating the features of a vacuum cleaner and a power scrubber and polisher in one complete set of equipment at relatively low cost, the new Black & Decker outfit consists of three primary units. The Vackar vacuum cleaner is highly portable and removes loose dirt from cushions. The Lectro-Kleener uses a rotary brush and non-inflammable odorless solvent to scrub the upholstery free of all grease and stains. The Vackar is used to remove excess moisture and a polisher is then used with the power Lectro Machine to raise the nap of the upholstery and speed drying.—AVIATION, *October, 1937.*

Aperiodic Compass—

Designed for high speed long range aircraft

NUMEROUS REFINEMENTS are incorporated in the type 154 Kollsman Aperiodic Compass, which has been designed to meet the requirements of new high speed long range aircraft. Construction is simple, with ■ perfectly smooth bowl rotatably mounted on a rigid base, having a glass top and containing the liquid, two parallel reference lines and the magnetic element. The instrument contains an internal vibration absorber, permitting direct mounting of the base to the airplane structure, while the entire compass is enclosed within a bakelite case except for the glass top.

By special mounting of the reference lines adjacent to the magnetic element parallax errors are eliminated and the compass may be read from wider angles of observation. Also because of this arrangement of the reference lines a second glass cover is unnecessary and possibility of collecting dust ■ moisture between two glasses is eliminated. An improved type internal expansion chamber reduces the possibility of air bubble formation and further provides accommodation around the outer edge of the glass top to accomodate any such bubbles as might form, thus completely eliminating air bubbles from the working field of the compass under all conditions.

A further feature is the provision of independent illumination for the compass scale and bowl, with lamps replaceable in flight. Weight of the instrument is five pounds and one ounce.—AVIATION, *October, 1937.*

(Turn to page 72)

Type 154 Kollsman Aperiodic Compass

THE AVIATION NEWS

DANIEL SAYRE
C. F. McReynolds, *Pacific Coast*
Blaine Stubblefield, *Washington*
E. R. Lockin, *New York*

HIGHLIGHTING RECENT EVENTS IN THE AVIATION WORLD

OCTOBER 1937

Air Races: Fuller, Wittman, Kling Sweep Trophies—

New Records for Bendix and Davis. Thompson Thrills

A HUGE WOODEN GRANDSTAND at one side of a colossal airport. Across 1046 acres (made much-of on opening day) toy sized transports shuttle in and out, their engines drowned deep beneath the announcers steady blatting through the public address system, beneath the blare of massed-but-discouraged bands, beneath the rumble, cough, whine, drone, roar of the Air Meets' planes. . . . Somewhere a signal-mortar booms. From the south end of the field a full squadron of two-seater Air Corps Consolidated pursuits lifts off for an hour's mass maneuvers.

The same boy passes your seat for the eighth time selling "souvneer Sun helmets." Two engineers you haven't seen since the air races at Cleveland in 1935 stop by to trade theories on wing-clipping and hangovers. The Air Corps finishes off with a Luffberry circle. Somewhere a signal-mortar booms Count Hagenburg or Tex Rankin or Capt. Papana roll slowly over on their backs to start a stunting routine. Or maybe its Dick Renere in his Junior out mowing grass or Hal Johnson jazzing the rivets out of his old Ford timmotor.

Some one lends you his photographer's badge that will get you past the gate onto the field. Passing the announcers stand you notice the water lillies in that weirdly peaceful pond are wired into place on sticks. The mortar lets go again. Four little racers go bounding across the infield, lift, then go whining around the first pylon. The loud speaker blatts "Will all parachute jumpers please report at once. Will all parachute jumpers please report at once . . ." A boy comes past and sells you the fourth hot dog you have had since lunch. . . .

Next day its the Marines or the Navy or the Army's Skylark Trio you remember, or maybe the Taylor Cub taking off and landing from that platform on top of an automobile. Two races, three, . . . qualifications for the Thompson. You spend most of the day with the Army men you met last night at the Rex's.

On Labor Day people spread out to the left within the ten foot canvas fence as far as you can see. Lord knows how many are kibitzing from outside. Inside, the experts guess 75,000, 100,000, 150,000.

Bendix: The story as it can be summarized begins days before the first Bendix starter roars down the Burbank runway. Major Seversky starts west, lands casually at Floyd Bennett Field. A brake locks and collapses a strut. One of three Seversky's is out. . . . Roscoe Turner has engine trouble at Albuquerque. Then at Burbank a welder sets off an explosion in the tank of his big Wasp Meteor. That puts Roscoe out of the Bendix at least. . . . Art Davis en route from Utica noses over his reconditioned Wedell-Williams near Anderson, Ind. . . . At Cleveland, Anthony LeVier crashes his Pobjoy Special, but is uninjured. Lee Miles, 1934 champion, is killed testing his four-year-old Miles-Atwood Special throwing a pall of gloom over every air race fan in the country. At Burbank the usual flare-up over the usual waiving of all but the be-there-for-the-start qualifications.

First down the Burbank runway at 1:04 A.M. Friday is Jacqueline Cochrane in a special Beechcraft. By 5:16 A.M. seven are in the air. One, R. E. Perlick has crashed in take-off but is uninjured. At St. Louis Joe Mackey, flying Roscoe Turner's Modified Wedell-Williams is forced out by oil trouble.

First place into Cleveland ($9,000) goes to Frank Fuller in his Seversky by a margin of almost two hours. Stopping only at Kansas City he clocks into Cleveland without landing, breaking the record with a time of 7 hrs. 54 min. Continuing on to Bendix, N. J. he once more clocks in ($1,500 extra) then swung down to land at Floyd Bennett, breaking the Bendix Transcontinental record in ▪ hrs. and 35 min. ($2,500 extra). All the other starters finished at Cleveland. Second: Earl Ortman at 9 hrs. 49 min. in a Modified Keith Rider ($5,000). Third: Jacqueline Cochrane at 10 hrs. 29 min. ($3,000 plus a special $2,500 posted for women entrants). Other finishers: Frank Sinclair, 11 hrs. 2 min., in a Seversky ($2,000); Milo Burcham 11 hrs., 4 min., in a Lockheed 12A ($1,000); Eiler Sundorph, 12 hrs. 17 min., in a Sundorph Special. Every finisher in the money had flown behind Pratt and Whitney Wasps, three of them behind Twin Row Jrs.

Wide World

Kling 46.42.54; Ortman 46.43.11

Friday: Air Race Fridays are not usually noted for their action. This year was a marked exception. The Bendix racers arrived. Wittman took the first closed course race of the meet qualifying at 237.2 m.p.h. for the James V. Davis Trophy Race along with Don Rae, Art Chester and C. W. Whittenbeck. A Buddy Batzel did a bat wing drop (a la Clem Sohn) from 10,000 to 1,000 ft. Another jumper Joe Crane, broke an ankle. The service

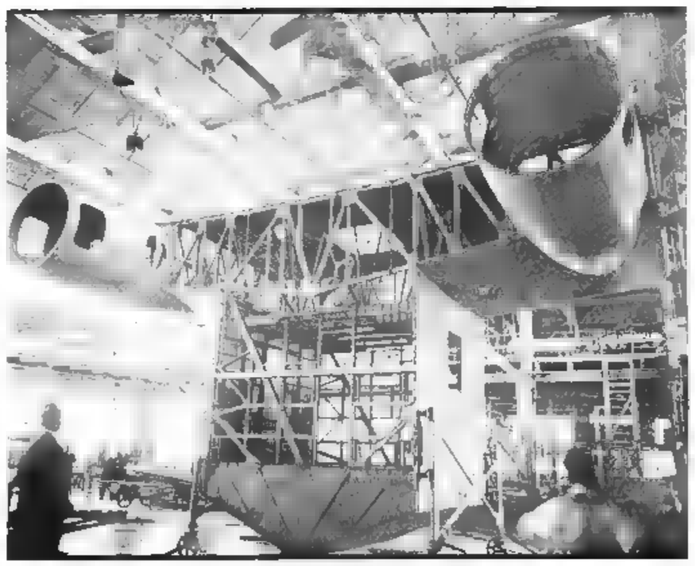
Steve Wittman: First in Davis; Second in Greve; Bidder in Thompson

squadrons uncorked a lot of new stuff including ■ string formation by the Air Corps with planes shifting from one file to another at Capt. Ned Schramm's command. Worst gasp of the day is produced by the inverted flying of Count Hagenburg. Past the stands with no more than four feet of altitude. A second pass at the same altitude. Third time as he pushes forward on the stick at the end of his pass his tail strikes. His plane—a Jungmeister skids ■ hundred yards as it twists into ■ crumpled mass. An hour later the Count rides back from the field hospital ready for more flying. Other Events: Gladys O'Donnel wins the Earhart Trophy Handicap Race for gals at 129.6 m.p.h. ($450). H. A. Spiller is announced as winner of the C. G. Taylor Trophy and $150.

Saturday, Sunday: With the Greve and Thompson trials and the James J. Davis Trophy Race the closed course program got into full swing. By Saturday evening Steve Wittman and his backyard-built racers were universal subjects of conversation. His 224.7 m.p.h. in one of the two Greve qualifying races not only won that heat by a wide margin, but topped the speed with which Rudy Kling won the other Greve preliminary. In his "big" job, powered with an old Curtiss D-12 he had posted the fastest qualifying speed for the Thompson—275 m.p.h. Then in the final race of the day, the Davis Trophy event for engines of less than 397 cu.in. displacement, Wittman romped away with first money ($3,700) at 245.3 m.p.h., ■ new world's record for the class ($1,000 extra). Roger Don Rae and Art Chester also were credited with breaking the former mark. As background the Air Corps paraded nine of their Boeing "flying fortresses." Tex Rankin and Capt. Papana led the stunting. George Peterson, jumper, was seriously injured in a slam landing. Sunday with two qualifying races for the Thompson and the Greve final, the calibre of the racing ships grew heavier. The Greve was a hammer and tongs affair between Wittman, Rae and Kling for the first half of the race, then Wittman and Kling moved out together, Gotch replacing Rae in third position. At the finish less than a second separated Kling (232.27 m.p.h.) and Wittman (231.99 m.p.h.). A high wind had hampered all the racers. Count Hagenburg renew his stunting in a borrowed ship—but kept ■ "safe" minimum altitude of 20 ft. Two more jumpers were injured when the wind carried them out of the airport, Kim Scribner critically when he was thrown into the windshield of a parked car. Turner was reported as on the way.

Thompson: Those who saw the Thompson Trophy Race meet-finale Labor Day afternoon will be pooh-poohing eye-lash finishes for the rest of their lives—"Why back in 1937 at the Cleveland Races, I saw. . . ." As ■ natural build up, ■ third qualifying race was run off to permit the entries of finally-arrived Roscoe Turner, and of Wittman and Kling who had been ruled out the day before due to failure to cross the starting line on time. Once more Wittman showed his mettle with the best time, 259.1 m.p.h. with Turner ■ close second. The stunters and military squadrons out-did themselves. Frank Hawks showed off the Gwinn Air Car adding to the general light-plane interest stirred up by the group of Waterman's Arrowbile which had been much in evidence, and a Taylor Cub operating off ■ platform on top of a car, and three wheeled Waco.

The signal mortar boomed for the Thompson. Nine stub-winged racers bounded across the infield. By the end of the first lap it was Wittman first by ■ widening margin, Turner and Ortman battling for second, Kling hanging on. Lap after lap the tall ex-school-teacher from Oshkosh kept his Wittman special moving from the pack until his margin ran to well over half a lap beyond the Turner-Ortman battle for second. In any race but the Thompson bookmakers would have begun paying off as he rounded the pylon for the start of his nineteenth lap. Then suddenly the low-flying leader pulls up to 2,000 ft. and drops slowly back. Turner piles into the lead, then back of the stands on the westward leg is confused by the sun, turns to make sure of a pylon. Ortman pushes ahead with Kling on his tail and above him. Around the last turn neck and neck. Kling puts his little yellow ship into ■ power dive, slips into first place ($9,000) at 256.910 m.p.h.; Ortman second ($5,000) at 256.858 m.p.h.; Turner third ($3,000) at 253.802; Frank Sinclair fourth ($2,000) at 252.360 m.p.h. Wittman who landed with ■ oil-coated windshield was forced to be content with fifth ($1,000) and $900 of lap money. A bent propeller tip, indicating he had struck a bird, had caused enough vibration to loosen an oil line and slow him hopelessly.



Cross Section: The Seattle Leviathan, otherwise the first Boeing 314, begins to take ■ape. Notable ■ the huge nacelles in which an engineer will be able to sta■ erect to service ■ ■ accessories in flight; the horizontal girder dividing the hull into upper and lower decks. Last month another Boeing colossus, ■ XB-15 bomber rolled out for flight tests.

THE SERVICES

Wright Field: Automatic Hook-Up Lands Plane Blind

THE AIR CORPS broke into headlines during the last week in August by announcing the completion of a "series of history-making experimental flights at Wright Field in which a large army cargo plane was landed several times under full automatic control." Even in the vague terms of the general press release, it all sounded pretty exciting.

The real technical story, as staffmen of The Aviation News gathered it, emerged as "history-making" ■ the Army had called it.

First of all, the landings were not made by any process similar to the "Queen Bee" type of remote radio control in which the operator of the control unit must have the ship in sight during the landing. Further they were not made by the method United Airlines has developed. That utilizes a Sperry automatic pilot coupled with a "bent-beam" type of radio blind-landing range.

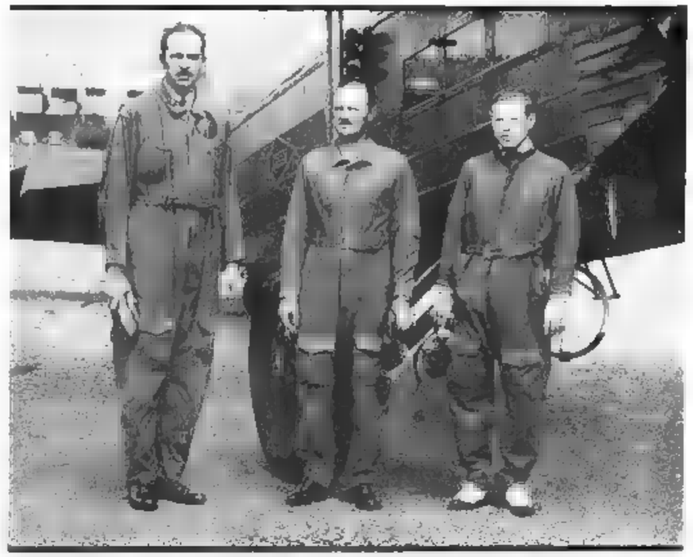
Rather the landings carried out at Wright and Patterson Fields represent the result of a two-year Corps project to tie the Hagenberger instrument-landing system up with the Sperry system in an absolutely automatic technique. Capt. Carl J. Crane, director of the Instrument and Navigation Laboratory at Wright Field, has been in charge of the project. Capt. George W. Holloman has conducted practically all the flight tests. Mr. Raymond K. Stout, project engineer, has designed the various instrument units assisted by Mr. C. D. Barbulesco of the Signal Corps Aircraft Radio Laboratory.

For over a year Air Corps test planes have flown "automatically," as regards direction, for great distances. Trips have been made from Wright Field ■ far ■ Texas with the automatic pilot directed by a homing radio compass. Other trips have been made in closed circuits over most of the Atlantic Seaboard States.

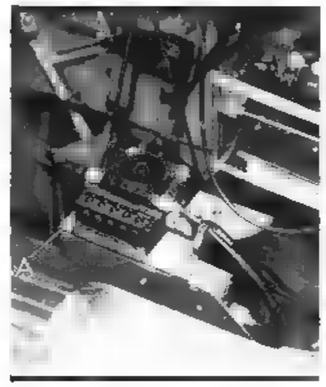
To extend this technique to include automatic landings the engineers have added to the relay connection between the radio compass and the Sperry pilot: (1) A radio-plus-sensitive altimeter control of the throttle setting so that the aircraft will approach the airport in a power glide at an angle well above the stall. (2) An automatic control of throttle and wheel brake through action of the landing gear strut, which stops the plane as quickly as desirable after ground contact is made.

The ground set-up consists of from three to five low-range nondirectional radio beacons of "stepped" frequencies, but all operating in the 200 to 400 kc. band. Associated with each of these are vertical radio markers operating in the ultra-short wave-lengths. At each major landing field these would be set up in a line extending say five miles from the runways.

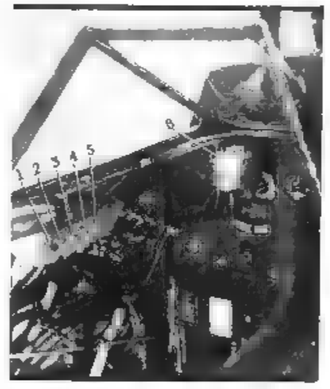
The pilot's sole task would be to fly his ship to ■ point within range of the outermost beacon at some pre-assigned altitude, say 2,000 ft. then push the automatic landing switch. As explained in the accompanying chart: When the ship arrives over each successive beacon it is directed toward the next



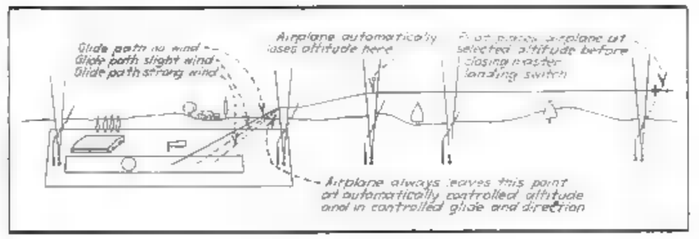
Button Pushers: Capt. Carl Crane, Capt. George Holloman, Raymond Stout.



Tell-Tale: Frequency selector which informs pilot of radio frequency in control of plane at each instant.



Magic Button: (1) The master landing switch (2, 3, 4, 5) Reset switches (B) The Sperry Gyro Pilot.



Worlds Largest: Through this hugest self-contained hydraulic press ever manufactured (press capacity 5,000 lb.) will flow piecemeal a goodly share of the Air Corps bombers, Navy torpedo planes, DC3 and DC4 transports which form for Douglas ▬ biggest order backlog in the history of ▬ industry. The press is by the Hydraulic Press Mfg. Co.

by the automatic change in tuning of its receiver unit. Arrived over the innermost beacon the throttle-control relay puts the ship into a predetermined glide angle.

Arrangement of several beacon rows about an air terminal or provision to have the innermost stations mounted ▬ mobile trucks would permit allowances for wind direction. However, many of the landings so far carried out have been made without trouble in cross winds of considerable force and gustiness. Three wheel landing gears will also largely eliminate what side-wind difficulties might be expected under low-ceiling conditions.

One sidelight: Capt. Crane confessed many humorous cases during the past two years research of "nervous shoe laces" and "jittery hands" on the part of the crew aboard the test planes as pilots fought their instinct to take over the controls.

Which to choose?

Capt. Crane himself makes the point that any blind-landing system to be practical should be adopted ▬ an exclusive countrywide scale. Unfortunately for the sake of simplicity, the Air Corps landings coincided almost exactly with an inter-airline conference of pilots and radio experts gathered at Oakland to watch demonstrations of the technique by which United's research ship has made hundreds of successful landings using the Sperry-plus-bent beam system. With minor modifications the conference decided the latter was the system they could now agree on. On the heels of that decision Bendix Radio announced it was rushing work on four ground units using the bent beam —presumably for Newark, Chicago, Kansas City and Burbank. General understanding is that the Bureau of Air Commerce is agreeable to the airline project although it has made no announcement.

The splendid work of the Air Corps puts American aviation in the queer position of suffering an embarrassment of apparently satisfactory blind landing devices. Perhaps some combination of "best features" will turn up.

Contract—The War Department announced Sept. 1 the placing of an order for 455 aircraft engines and spare parts with the Pratt & Whitney Division of United Aircraft. Contract price was $4,153,939. Of the units 315 are to be twin-row 1000 hp. Hornets and are intended for the 210 P36 A pursuit planes under construction by the Curtiss Company. Another 128 will be 550 hp. Wasps and are to go into the 85 basic combat planes building at North American.

Few days earlier ■ similar announcement disclosed ▬ order for 240 electrically controlled Curtiss constant-speed propellers for the P36 A's. Contract price was $512,262. Mounting three hollow steel blades each, these are the first propellers of this type to figure in a production contract. The 36 A's ex-engines and ex-propellers are to cost $4,113,550 and are scheduled for delivery at the rate of one a day beginning next Jan. 1.

School—A school of Aviation Ordnance has been established at Langley Field to give enlisted men thorough indoctrination in their duties in the six G H Q Air Force Ordnance platoons. Subjects taught will include the storage, handling and preparation for service of bombs, fuses, pyrotechnics, small arms, ammunition and machine guns. Captain Edward P. Mechling, Ordnance Department, will be director of the school which will open the first of three sessions scheduled for 1937-1938 in October.

Peru—The aircraft carrier Ranger, still the navy's newest and swiftest, was dispatched Sept. 4, to Callao, Penn. to give a demonstration of naval ▬r operations in connection with the Inter-American Technical Aviation Conference opened at Lima, Sept. 16. The Ranger commanded by Captain John Sidney McCain, carried 78 planes and was accompanied by the destroyers Worden and Hull.

Engines—A contract amounting to $380,609 for engines and spare parts let to the Pratt & Whitney Division of the United Aircraft Company has been announced by the Bureau of Aeronautics. Number of units involved was not released, but the engines are to be mounted in scout observation planes under construction at the Naval Aircraft factory at Philadelphia.

Squadrons—Rear Admiral Cook in ■ brief address September 3, at Cleveland, Ohio—"The present Naval Aviation Policy . . . calls for 2,000 planes by 1941. . . . I am glad to be able to say that this program is proceeding very satisfactorily. There are actually ▬ hand over 1,000 modern airplanes and an additional 800 are ▬ order or funds are available for their purchase. When the entire program is completed, we will have 68 combatant naval squadrons, of which 39 will be shipborne, 22 tender-based and 7 attached to the Fleet Marine Force."

AVIATION IN WASHINGTON

by Blaine Stubblefield

WHY CONGRESS WENT HOME without passing any important aviation law is not quite clear. Apparently the McCarran-Lea air transport regulatory bill was defeated, single handed, by Senator Kenneth McKellar of Tennessee, chairman of the Post Office committee. But that strange combination of journalists, politicians, lobbyists, and bar-room kibitzers commonly called Washington Observers, are not satisfied with such an easy explanation. They say now that Mr. Roosevelt was opposed to any legislation that would deflate the Post Office. The reason: because Mr. Farley ■ actually interested in the PO.

If Mr. Farley coached the President against anti-Post Office laws, those who hope for such laws next session would thank the Pierce Arrow people for taking an offside hitter out of the play. Hardly anyone now believes that the President himself is still provoked at air transport, if he ever was. It was the Bad Boy from Alabama who put the gum drop in the carburetor. But Senator Black has gone over the Hill to the Court House, where, to be sure, he can still cloud up the horizon, but not so easily.

Cocktail sippers at the Carlton say that Uncle Dan Roper is going to quit the Department of Commerce about New Year's, but he will need ■ job and might become Postmaster General. The Commerce Department and the Post Office are more or less in cahoots against the Interstate Commerce Commission for air transport control. Would Uncle Dan tighten the alliance or slacken it? Would he, for instance, help take safety control away from the Bureau of Air Commerce if he thought it would improve the service?

And if Texas wants to elect Post Office Solicitor Karl Crowley as governor, some of the flying boys won't be mad. United Air Lines isn't beefing about the gate being shut ▬ its Salt Lake-Los Angeles cutoff deal with Western Air Express. The latch is closed but there's no lock. It can be opened again. There seems to be no law to prevent an operator from flying from ▬ of his termini to another by any route he chooses. The routes belong to the United States and are free for all. We'll hear more about this.

Wags say that President Roosevelt could not possibly have approved a bill to expand an airport named Hoover. Mr. Roosevelt's veto of the bill, his suggestion that Gravely Point, 15 minutes from town, would be ■ good bet, and the War Department's permission for transports to use Bolling Field—met general acclaim all around. Washington's ten-year-old quibble about an airport is just ■ local story, but it has a national angle. The airline pilots association rubbed out Hoover field, and now feels its power to get what it wants.

Talk about moving the Weather Bureau out of Agriculture to some other government department is so much conversation. The Bureau's aviation service makes headlines, but farmers and the public are still Weather's biggest customers. The Bureau has an extra half million dollars for aviation service in fiscal 1938. It will add personnel—with better training, and install new and more equipment, give more frequent reports. Radiometeorograph and airplane observations at Fairbanks will be aimed at analysis of cold wave development near the pole.

Enactment of a crop control law next session, to which Congress has agreed, will boom the aerial farm survey business. At present AAA and other government agencies have 600,000 square miles under the camera's eye. The policy is to repeat every five years, to reveal erosion, burns, changes in fence lines, etc. The time will come when all U. S. arable land will be aerophotoed. A skilled "reader" with his stereoscope can tell beans from tobacco on a 10,000-foot shot. With ■ planimeter he can measure the acreage of a field within one per cent of accuracy. Cost of mapping is about two cents per acre. Fifteen survey concerns are now under contract to the government.

Anyone who thinks people don't blush anymore in these modern times can prove the contrary by mentioning to certain officials in Washington the appointment of P. G. Johnson as manager of Canada's transcontinental airway.

That story about the United States swopping helium for German diesel engines or designs is a "phoney" as the news men say. It traces back to bull sessions, maybe in the Navy building. In the first place, it seems the United States does not, and most likely will not, do any bartering of that kind. If it wants diesels it will buy them with money. Furthermore, German diesels are buzzing around in commercial service, long since off the secret list. Plenty of smart people this side of the Atlantic know how they work.

Speaking of Helium, that proposed joint dirigible operation between the United States and Europe is still a live issue between Goodyear and the German Zeppelin company. If the service is started it won't be ■ three-cornered run including South America, though. The new law, which gave the government a monopoly on helium and authorized it to sell to foreign countries for commercial use, also specified that any helium-floated lines must serve only the United States or its

At Long Last: TWA gets its extension into San Francisco. United gets three adverse decisions (See AIRLINES). Critics of the Post Office wonder out loud if it's because United is still suing for cancellation damages.

territories and one other country per line.

Last winter the Bureau of Air Commerce had an airplane teletype receiver that would keep ▬ typing while upside down or rolling on the floor, if you please. About now another receiver that will take facsimile, maps, drawings, figures, type, handwriting or whatever, is ready for demonstration in New York.

Some time in October the United States and Canada will confer on operation of an airline between the U. S. and Alaska. The point is that we own Alaska but Canada owns the air between here and there. The weather is pretty awful along the coast, and we want to fly inland, East of the mountains. Neither Canada nor the United States had announced the meeting or appointed conferees as this is written. Canada wants to project an airline into the United States, ▬ a deal should be easy enough. Anthony Joseph Diamond, Alaskan delegate to Congress, tells us the line will do a good business, carrying rich travelers and men on business missions to a prosperous country.

For a long time the increasing inadequacy of airports in the face of bigger and faster airplanes was just an academic question. Now that some cities are getting passed by they feel a twinge ▬ their pocketbooks. Congress sidestepped the issue this year, but next year there will be a law calling for adequate airports. The check, of course, will be passed to the benevolent old gentleman in the star spangled pants.

It's a middling safe bet that when Grover Loening finishes his study for the Maritime Commission, he will find parts of the maritime laws applicable to overseas air transport. When American Export Steamship Company said it wanted the right to add modern equipment, including airplanes, to protect its trade routes, it sounded the call to ▪ decade of world-girdling.

Howard Morgan: Climbed off ▪ bus.

AVIATION PEOPLE

Appointed: HOWARD MORGAN, as assistant to the vice-president of TWA in charge of traffic. Morgan enters air transport from the bus transportation field. In 1913 he organized United Stages operating out of San Francisco. In 1926 he became traffic manager of Pickwick Stages System, and three years later president of Greyhound-Pickwick Lines. From 1934 to 1936 he was president of Santa Fe Stages. Morgan was organizer of the Greyhound Traffic Managers Association, which became a post-graduate school for salesmanship in transportation traffic.

GEORGE GARDNER, as assistant ▬ W. I. VAN DUSEN, director of public relations for Pan American Airways. One-time staff writer for the *New York Herald Tribune*, Gardner has for some years past been assistant chief of the Information Section of the Bureau of Air Commerce.

Transferred: LT. COMMANDER GEORGE LEO COMPO, from his post as Aviation

Ralph McClarren: Broadened his Field.

Officer and Staff Commander of the Battle Force on board the USS California, to that of Inspector of Naval Aircraft at the Curtiss Aeroplane Division of the Curtiss-Wright Corporation at Buffalo. He replaces LT. COMMANDER RUTLEDGE IRVINE. Lt. Compo's War record won him the D.S.C. He has served ▬ the Langley and Lexington.

WARRANT OFFICER WILLIAM D. PINKSTON of the U. S. Coast Guard Aviation Unit, from his post ▬ Aircraft Inspector at Hall Aluminum Aircraft Company, to the Curtiss plant at Buffalo. His job will be the inspection of the three SOC planes for Coast Guard service.

Expanded: the assignments of RALPH H. MCCLARREN, aeronautical engineer of The Franklin Institute of Philadelphia. His activities heretofore confined

Joe Gwinn: Unveiled his Air Car.

to the aviation section, McClarren now is assistant associate director in charge of land transportation, prime movers, building materials, railroad engineering and mechanisms. An ex-pilot, he is secretary of the Aero Club of Pennsylvania and consulting engineer for Pennsylvania Aircraft Syndicate, Inc. He was design engineer on the Herrick Vertaplane (AVIATION, September 1937), and had an active part in the design of a gyroplane for the Navy.

Introduced: to the trade at the National Air Races at Cleveland, the new flying "aircar" designed by JOSEPH MARR GWINN, JR. (See page 36). Behind Gwinn's design are twenty years of aeronautical experience, beginning with his enlistment ▬ a private for ground school in Texas in 1917. He engaged in combat service at the front with the 27th Aero Squadron, and after his return ▬ 1919 spent about a year in the automobile industry. He returned to aviation in the engineering department of Gallaudet Aircraft Corporation at East Greenwich, R. I. Three years later he was with Consolidated Aircraft Corporation ▬ assistant chief engineer, resigning in 1935 to assume presidency of the Gwinn Aircar Company, Inc.

Boosted: this year's income taxes of WILLIAM R. STAGGS, Flying Cadet, on board the aircraft carrier "Ranger." He won the $100,000 first prize in the Old Gold Contest.

Cadet William Staggs: Won $100,000 Gold (Old)

Arrived: GENERAL ULISSE LONGON, Italian army flyer, enroute to Peru to represent his country at the Pan-American Aeronautical Conference. Twelve of his compatriots went directly to Lima where they will exhibit stunt flying. . . . MARCEL DORET, French acrobat and long distance flyer, accompanied by EMILE DEWOITINE, aircraft manufacturer. Doret brought the plane with which he plans to make exhibition flights in Canada and possibly Chicago and Cleveland.

Gone Abroad: CAPTAIN JAMES HAIZLIP, who in order to devote all his time to European plane sales activities, has resigned from the aviation department of Shell Petroleum Company. He, wife MAE, and son JIMMY, will headquarter in Paris and London while flying about the Continent. Haizlip was 1932 winner of the Bendix Trophy; wife Mae is holder of the American speed record for women.

DR. WILLIS R. GREGG, chief of the U. S. Weather Bureau, and IVAN R. TANNEHILL, chief of the Marine Division, to represent the Bureau at the International Meteorological meetings held in Salzburg, Austria, in September. Dr. Gregg is president of the newly organized Commission on Projections for Meteorological Maps, which held its first meeting Sept. 16. Tannehill, chairman of the Weather Bureau Committee on Clouds and Cloud Forms, also visited meteorological offices at Paris, DeBilt, and London.

American delegates, advisers, and technical experts, representing the Department of Commerce, the Weather Bureau, and the Federal Communications Commission at the International Technical Aviation Conference called at Lima, Peru, Sept. 16 to 23. Meteorological problems, especially as affecting aviation and communication relations between the Pan American countries, were discussed, and a meeting of the third regional meteorological commission of the International Meteorological Organization was held at the same time. Party was composed of delegates: DR. HARRY BLOCK, chairman, DR. GEORGE W. LEWIS, RICHARD SOUTHGATE, DENIS MULLIGAN, GERALD C. CROSS; advisers: EDGAR B. CALVERT and DELBERT M. LITTLE; technical experts: WARREN KELCHNER, EDGAR B. CALVERT, DELBERT M. LITTLE, W. E. JACKSON, A. B. MCMULLEN, EDWIN L. WHITE, and SYDNEY B. SMITH, secretary.

Feted: CHARLES C. KING and JOHN H. DARRAGH, JR., by officials and employees of Wright Aeronautical Corporation, at a dinner celebrating their election ▬ treasurer and assistant treasurer, respectively, of the company. King, formerly comptroller, fills the vacancy created by the death of JAMES J. DONAHUE; Darragh was formerly chief accountant. Both have been affiliated with the company since the World War, when they held positions with Wright-Martin Aircraft Company, predecessor of Wright Aeronautical Corporation.

Organized: By ALFRED EASTON POOR and JOHN WALTER WOOD, the firm of Poor and Wood, airport consultants, with offices in New York City. Associated with them are EDWARD P. WARNER, AVIATION'S former editor, and EMIL PRAEGER, engineer. Poor, an officer in the Naval Air Service during the war, has twice been sent to South America by Pan American Airways on airport work. Wood is known to AVIATION readers through his three recent articles on airport design (page 26). Warner, Secretary of the Navy for Aeronautics in 1926 and vice chairman of President Roosevelt's Federal Aviation Commission, is well known ▬ ▪ designer and consultant, and ▬ the author of aeronautical text books. Praeger was assistant chief engineer in charge of structural design for Curtiss-Wright Airport Corporation, and has done airport work for the Signal Corps.

Promoted: To the post of vice-president in charge of operations for Western Air Express, C. N. JAMES, connected with the company since 1926.

CLARENCE E. FLEMING, to be assistant general traffic manager of TWA. Joining TWA in 1934, he has been successively mail traffic manager, general agent, and central region traffic manager. In addition to his new duties he will continue as mail traffic manager. Twelve years ago Fleming helped organize National Air Transport and later became traffic manager of Southwest Air Fast Express. On absorption of the latter by American Airways in 1930, he continued as general traffic and mail manager.

Prepared: for the SAE's Second Annual National Aircraft Production meeting held in Los Angeles on October 7-9, papers by DONALD H. WOOD of the N.A.C.A.; A. LEWIS MACCLAIN and R. S. BUCK of Pratt & Whitney; HENRY A. BERLINER of Engineering & Research Corp.; COL. E. J. W. RAGSDALE of E. G. Budd Manufacturing Co.; ROBERT JOHNSON of Wright Aeronautical Corp.; C. A. VAN DUSEN of Consolidated Aircraft Corp.; H. OLIVER WEST of United Air Lines; MAJOR JOSEPH T. MORRIS, U. S. A. C.; FRED ARNOLD, U. S. N.

Wide World

A Day at the Races: Vincent Bendix (left) and husband, Floyd Odlum, ▬ gratulate Jacqueline Cochrane on her third place in the Bendix race.

INDUSTRY & FINANCE

Anchors—The Northill company which manufactures and markets a number of aeronautical products including the Northill Folding Anchor for seaplanes has completed a new factory and office building in Los Angeles. John K. Northrop serves the firm ■ chief consulting engineer.

Los Angeles—Just as though it didn't already have its share of such things Los Angeles County is shortly to have another aircraft factory to be known as the Lobil Aircraft Corporation. The new company plans to specialize in military types. President is Josef S. J. Hlobil, an engineer formerly with the Consolidated Aircraft Corporation. Directors are Charles T. Leigh, vice president of Consolidated; E. J. Rivers of North American; Gregory M. Creutz and E. J. Dickinson.

Sales—Dwane L. Wallace, president of Cessna Aircraft, reports Cessna sales for the seven months ending July 31 totalled $177,919 compared with sales of $62,204 for the corresponding period a year ago. A large backlog of orders include planes for Canada, South America, Africa and Australia.

Show—A few more details are now available ■ the airshow to be held Jan. ■ to Feb. 6 next winter in Chicago. Designated by the Aeronautical Chamber of Commerce ■ the sole class A show for 1938, it will be known ■ "The International Airshow." Officers of International Air Show, Inc. formed to manage the project, include James H. Dunbar, Jr., executive vice president and Maynard W. Schryver, vice president and general manager. Both are from Chicago. Financial sponsors include C. R. Walgreen, C. R. Walgreen, Jr., George Getz, A. G. Atwater, L. C. Reid, J. A. Mudd, Jr., Justin Dart and S. J. Bowyer, all of Chicago, and William N. Wilson of Indianapolis. A 1700 ft. runway adjacent to the International Amphitheater, which will house the show, has been approved by the Bureau of Air Commerce for landing planes flown in for exhibition.

Africa—Fairchild Aviation reports the sale of two planes, ■ deluxe "45" and a deluxe Warner-powered "29", to Harry Shires, managing director of Africa Flying Services, Ltd. of Johannesburg, South Africa, a firm recently appointed Fairchild distributor for the whole South African territory. The "45" is being elaborately equipped and will mount a Fairchild RC-4 Radio Compass.

China—Bellanca Aircraft Corporation of Newcastle, Del. last month disclosed plans to bring out two new models. One aimed at the $3,000 price class will be a three-place cabin design. The other, to sell for less than $10,000, is to carry five. The remarkable Bellanca trimotor built for Captain Alex Papana of Rumania was finished in time to make an appearance at the Cleveland races. Meanwhile the recently finished fleet of nineteen 28-90 twin-row Wasp-powered Bellanca Flash monoplanes (similar to the ship originally developed as Col. Fitzmaurice's entry in the MacRobertson Race) last month made international headlines. Some time ago their shipment to Europe consigned for use as mail planes by Air France was forbidden by the federal government on the grounds they were likely to find their way into the Spanish conflict. Suddenly late in August it was discovered with some excitement in Washington that the nineteen planes were on their way to China aboard the freighter Wichita. Although Bellanca was far within his rights (no Chinese-Japanese war hence no "neutrality" having been recognized by the United States government) the shipment was removed in San Diego.

Consolidated—The Soviet government has awarded ■ $750,000 contract for the construction of special tools and manufacturing jigs to the Consolidated Aircraft Corporation of San Diego. They are to be used for the manufacture of flying boats similar to the PBY-1 patrol planes Consolidated has furnished to the U. S. Navy. Earlier, Consolidated was reported cutting hours to spread work among its employees. Shortage of materials and lack of new business were given as causes.

Other Corps Contracts—To the Pioneer Instrument Corp., covering the purchase of 910 Type A-5 Bank and Turn Indicators and 300 Type C-7 Airspeed Indicators. Cost $82,292.

To the Kollsman Instrument Co. covering the purchase of 1,010 Type A-6 Indicators, 725 Type D-4 Indicators, 900 Type C-2 Tube Assemblies, 100 Type C-3 Tube Assemblies. Cost $119,190.

To the United Aircraft Corp. covering the purchase of additional propeller assemblies. Cost $26,450.

To the Weston Electrical Instrument Corp. covering the purchase of 1,000 Type B-7 Indicator Assemblies and Thermocouples. Cost $132,300.

To the B. G. Corp. covering the purchase of spark plugs, number not specified, $23,074.

» Boeing Airplane Company for the three months ending June 30, 1937—a net profit of $137,960 equal to 24 cents per share. Corresponding figures: For the first 1937 quarter $115,937 equal to 22 cents per share. For the second quarter of 1936 profits were $133,892 equal to 25 cents per share.

» Transcontinental and Western Air Inc. for the three months ending June 30, 1937—A net loss of $127,208. Corresponding figures: For the first quarter of 1937 a net loss of $359,933. For the second quarter of 1936 ■ net profit of $137,860.

» Waco Aircraft Company for the six months ending June 30—a net loss of $24,808 compared with a net loss for the same period in 1936 of $32,031. Sales first half of this year $583,613; first half of last year $525,799.

» Sperry Corporation (products reported over half for the aeronautical industry) for the six months ending June 30—a net profit from operations of $1,186,672 and profit of $183,794 from sale of securities. Corresponding figures for the first half of last year: from operations $602,100; from the sale of securities $1,055,024. Unfilled orders stood 60 per cent ahead of last year's June 30 backlog.

» Thompson Products and subsidiaries for quarter ended June 30—net profit of $459,744 ($1.53 a common share). For 1937 first half total net was $744,004 ($2.45 ■ share). Net profit for the first six months of 1936 was $574,059 ($1.93 per share).

» Weston Electrical Instrument and subsidiary for the six months ending June 30—a net profit of $251,150 ($1.26 per a common share). A year ago corresponding net profit was reported at $101,031 (45 cents per share).

Grumman: Stock Issue Marks First Appeal to Public

WITH UNFILLED ORDERS as of Aug. 17 totalling $3,380,000 the Grumman Aircraft Engineering Corporation last month announced the registration of 140,000 shares of common stock with the Securities Exchange Commission. Of these 40,000 will be reserved for exercise of warrants; 5,000 will be reserved for prior subscription by employees, and the remainder offered to the public. Hempill, Noyes & Co. are the underwriters for this the first public financing by the company.

Organized in 1929 to manufacture amphibian gears the firm received its

COMMERCIAL DELIVERIES

Purchaser	Type of Buyer	Manufacturer and Model	Engine Make and Model
Rochester A.	F.B.	Taylor-Young A.	Cont. A-40-4
Lunken, E.	Pvt.	Stinson SR 9-BD	Lyc. R-680-D6
Lapham, D.	F.B.	Taylor J2	Cont. A-40-4
Johannessen (Ex) K.	F.B.	Taylor-Young A.	Cont. A-40-4
Flannery, B. T.	F.B.	Stinson SR 8-B	Lyc. R-680-B6
Carpenter, W. K.	Pvt.	Taylor J2	Cont. A-40-3
Stavens, T.	Pvt.	Taylor-Young A.	Cont. 4-40-4
Vultee Aircraft	Corp.	Stinson SR 9-BD	Lyc R-680-B8
Bingman, M. R.	F.B.	Taylor J2	Cont. A-40-4
Gede, M.	F.B.	Taylor-Young A.	Cont. A-40-4
Sanford A'ways, Inc.	Corp.	Stinson SR 9-BD	Wr. R-760-E2
Wooster Aero.	F.B.	Taylor J2	Cont. A-40-4
Robinson, W. B.	Pvt.	Taylor-Young A.	Cont. A-40-4
Pollack, F.	F.B.	Stinson SR 9-EM	Wr. R-760-E2
Long Beach Airport	F.B.	Taylor J2	Cont. A-40-4
Leadbetter, G. E.	Pvt.	Taylor-Young A.	Cont. A-40-4
Spence, C. L.	Pvt.	Stinson SR 9-ED	Wr. R-760-E2
Hinsman, W. W.	Pvt.	Taylor J2	Cont. A-40-4
Livingston A'ways.	F.B.	Taylor-Young A.	Cont. A-40-4
Aviation Mfg. Corp.	Corp.	Stinson SR 9-BD (C)	Lyc R-680-D3
Motor City Airport	F.B.	Taylor J2	Cont. A-40-4
Van Briesan, F.	Pvt.	Taylor-Young A.	Cont. A-40-4
Card E. L.	Pvt.	Stinson SR 9-BD (C)	Lyc R-680-D5
Blevins Aircraft	F.B.	Taylor J2	Cont. A-40-4
Rintoul & Steinman	F.B.	Taylor Young A.	Cont. A-40-4
Tulsa Winch Co.	Corp.	Stinson SR 9-B	Lyc R-680-D6
Aircraft Assoc.	F.B.	Taylor J2	Cont. A-40-4
Ladovici, S.	Pvt.	Taylor-Young A.	Cont. A-40-4
Valaer, V.	Pvt.	Stinson SR 9-BD (C)	Lyc R-680-D5
Roberts, L. B.	Pvt.	Taylor J2	Cont. A-40-5
Koleman, R.	Pvt.	Taylor-Young A.	Cont. A-40-4
Rough, H.	Pvt.	Stinson SR 9-BD	Lyc R-680-D6
Blevins Aircraft	F.B.	Taylor J2	Cont. A-40-4
O'Neil, A. C.	F.B.	Taylor-Young A.	Cont. A-40-4
Edwards, K. M.	Pvt.	Stinson SR 9-FD	P&W TB-440
Dean, J. H.	Pvt.	Taylor J2	Cont. A-40-4
Fox Valley, F. S.	F.B.	Taylor-Young A.	Cont. A-40-4
Berry, W.	Pvt.	Stinson SR 9-FD	P&W TB-440
Snook, F. R.	Pvt.	Taylor J2	Cont. A-40-4
Aircraft, S. & S.	F.B.	Taylor-Young A.	Cont. A-40-4
Pacific State Aux. Corp.	Corp.	Stinson SR 9-FD	P&W TB-440
Warrington, M. F.	Pvt.	Taylor J3	Cont. A-40-5
Southern A'ways.	F.B.	Taylor-Young A.	Cont. A-40-4
LaGrone, Tex	Pvt.	Waco ZGC-7	Jacobs L-5
Aircraft Assoc.	F.B.	Taylor J2	Cont. A-40-4
Eno, E. E.	Pvt.	Taylor-Young A.	Cont. A-40-4
Lippiatt, H. C.	Pvt.	Waco YKS-7	Jacobs L-4
Aircraft Assoc.	F.B.	Taylor J2	Cont. A-40-4
Cannon-Nelson A'craft	F.B.	Taylor-Young A.	Cont. A-40-4
Fleet Aircraft (Ex)	F.B.	Waco YKS-	Cont. W-670
Neinke, Phil	F.B.	Taylor J2	Cont. A-40-4
Rost, B. F.	Pvt.	Taylor-Young A.	Cont. A-40-4
Dominion Govt. (Ex)	Govt.	Waco ZQC	Jacobs L-5
Aircraft Assoc.	F.B.	Taylor J3	Cont. A-40-4
Brinckerhoff, F. S.	F.B.	Taylor-Young A.	Cont. A-40-4
Wings Field	Pvt.	Waco ZKS-7	Jacobs L-5
De Ponti Av. Co.	F.B.	Taylor J2	Cont. A-40-4
Freeman, A. S.	F.B.	Taylor-Young A.	Cont. A-40-4
Cannon Nelson, Inc.	Pvt.	Waco ZKS-7	Jacobs L-5
Continental Motors	Pvt.	Taylor J2	Cont. A-40-4
Susquehanna, A. S.	F.B.	Taylor-Young A.	Cont. A-40-4
Cannon Nelson, Inc.	F.B.	Waco YKS-7	Jacobs L-5
Hangar Six, Inc.	F.B.	Taylor J2	Cont. A-40-4
Lumkin & Gross	F.B.	Taylor-Young A.	Cont. A-40-4
Tata Sons, Ltd. (Ex)	Trans.	Waco ZQC	Jacobs L-5
Hangar Six, Inc.	F.B.	Taylor J3	Cont. A-40-4
Bishop, F. S.	F.B.	Taylor-Young A.	Cont. A-40-4
Waco Sales of N. Y.	F.B.	Waco ZGC	Jacobs L-5
Foote, Lou	F.B.	Taylor J2	Cont. A-40-4
Schell, L. G.	Pvt.	Taylor-Young A.	Cont. A-40-4
Robbins Co., H. C.	Pvt.	Waco YKS-7	Jacobs L-4
Shaw, F. C.	Pvt.	Taylor J2	Cont. A-40-4
Fryer, R. E.	F.B.	Taylor-Young A.	Cont. A-40-4
Arlt, J.	Pvt.	Fairchild 24 G De Luxe	Warner S.C.
Wiggins, E. W.	F.B.	Taylor J2	Cont. A-40-4
Gowan, C. B.	Pvt.	Taylor-Young A.	Cont. A-40-5
Clardy, K. T.	Pvt.	Fairchild 24 H De Luxe	Ranger 6-390-D-3
Jamestown A'ways.	F.B.	Taylor J2	Cont. A-40-4
Lepper, A. E.	Pvt.	Taylor-Young A.	Cont. A-40-4
Elliott, T.	Pvt.	Fairchild G Standard	Warner S. S.
Fleck, F. J.	F.B.	Taylor J2	Cont. A-40-4
Fox Valley, F. S.	F.B.	Taylor-Young A.	Cont. A-40-4
Kurtzer, F. S.	F.B.	Fairchild 24 G Standard	Warner S. S.
Barr Av.	F.B.	Taylor J3	Cont. A-40-4
King Aircraft S. Co.	F.B.	Taylor-Young A.	Cont. A-40-4
Ladd, W. S.	Pvt.	Fairchild 24 G De Luxe	Warner S. S.
Phil Meinke	F.B.	Taylor J2	Cont. A-40-4
Reinkert, H.	Pvt.	Taylor-Young A.	Cont. A-40-4
Thomas, L.	F.B.	Fairchild 24 G De Luxe	Warner S. S.
Paulwankee Aport	F.B.	Taylor J2	Cont. A-40-4
Haymood, W.	Pvt.	Taylor-Young A.	Cont. A-40-4
African, F. S (Ex)	F.B.	Fairchild F-45	Wr. Wh.
Young, Al. K.	F.B.	Taylor J3	Cont. A-40-4
Harman, R.	Pvt.	Taylor-Young A.	Cont. A-40-4
Sham, H.	F.B.	Fairchild 24 G De Luxe	Warner S. C.
Burnham Miller, F. S.	F.B.	Taylor J2	Cont. A-40-4
Raymond, W.	Pvt.	Taylor-Young A.	Cont. A-40-4
Starratts A. & T. Co.	Trans.	[redacted] S3SA	2 Wr [redacted] E-2
Bowsher, A.	Pvt.	Taylor J2	Cont. A-40-4
Raymond, W.	Pvt.	Taylor-Young A.	Cont. A-40-4
Luber, F.	Pvt.	Monocoupe 90A	Lambert R-268
Airways, Inc.	F.B.	Taylor J2	Cont. A-40-4
E. T. Imparato	Pvt.	Taylor-Young A.	Cont. A-40-4
Gillespie, J. D.	Pvt.	Monocoupe 90A	Lambert R-386
Landrum J.	Pvt.	Taylor J2	Cont. A-40-4
Howe, H.	Pvt.	Taylor-Young A.	Cont. A-40-4
Franceschi, A.	Pvt.	Monocoupe 90A	Lambert R-268
Sinclair, C.	Pvt.	Taylor J2	Jacobs L-5
Midland, F. S.	F.B.	Taylor-Young A.	Cont. A-40-4
Pringle, P. B.	Pvt.	Monocoupe 90A	Lambert R-266
Boyce, Yeager & Gales	Pvt.	Taylor J3	Cont. A-40-4
Vetter, K. H.	Pvt.	Taylor-Young A.	Cont. A-40-4
Lin. Aero. Venezolana (Ex)	Trans.	Lockheed Electra	2 P & W Wasp, Jr.
Stoffel & Lamparter	Pvt.	Taylor J3	Cont. A-40-4
Central A'ways.	F.B.	Taylor-Young A.	Cont. A-40-4
Lin. Aero. Venezolana (Ex)	Trans.	Lockheed Electra	2 P & W Wasp, Jr.
Kyster, Paul	F.B.	Taylor J2	Cont. A-40-4
Bridgeport, F. S.	F.B.	Taylor-Young A.	Cont. A-40-4
Barr, A. C.	F.B.	Taylor J2	Cont. A-40-4
Brinckerhoff, F. S.	F.B.	Taylor-Young A.	Cont. A-40-4
Stockert, Homer	Pvt.	Taylor J2	Cont. A-40-4
Holmes, S. O.	Pvt.	Taylor-Young A.	Cont. A-40-4
E. W. Wiggins Airways.	F.B.	Taylor J2	Cont. A-40-4
Jennings Bros.	F.B.	Taylor-Young A.	Cont. A-40-4
Riccio, A.	Pvt.	Taylor J2	Cont. A-40-4
Culver, J. B.	Pvt.	Taylor-Young A.	Cont. A-40-4
Soults, B. B.	Pvt.	Taylor J3	Cont. A-40-4
Susquehanna, A. S.	F.B.	Taylor-Young A.	Cont. A-40-4
Southern A'ways.	F.B.	Taylor J2	Cont. A-40-5
Ruricks, J.	Pvt.	Taylor-Young A.	Cont. A-40-4
Southern, A. S.	F.B.	Taylor J2	Cont. A-40-4
Nelson, R.	Pvt.	Taylor-Young A.	Cont. A-40-4
Thomas, J. I.	Pvt.	Taylor J2	Cont. A-40-4
G. Massey & Ransom	F.B.	Taylor-Young A.	Cont. A-40-4
De Ponti, A. S.	F.B.	Taylor J2	Cont. A-40-4
Bohl, W.	Pvt.	Taylor J3	Cont. A-40-4
McCray, N.	Pvt.	Taylor J3	Cont. A-40-4
Montgomery Sch. of Aero.	Pvt.	Taylor J3	Cont. A-40-4
Sachsen, F. O.	Pvt.	Taylor J3	Cont. A-40-4
Bernard Airport	F.B.	Taylor J3	Cont. A-40-4
McCray, N.	F.B.	Taylor J3	Cont. A-40-4
Lithuanian Govt. (Ex)	Govt.	Taylor J2	Cont. A-40-4
Cub Aircraft Ltd. (Ex)	F.B.	Taylor J2	Cont. A-40-4
Cub Aircraft Ltd. (Ex)	F.B.	Taylor J2	Cont. A-40-4
Livingston A'ways	F.B.	Taylor-Young A.	Cont. A-40-4
Ellis, T. K.	Pvt.	Fairchild 24 H De Luxe	Ranger 6-390-D-3
Airways, Inc.	F.B.	Taylor J3	Cont. A-40-4
Meinke-Eldred, F. S.	F.B.	Taylor-Young A.	Cont. A-40-4
Hungerville, R. E.	Pvt.	Fairchild 24 G De Luxe	Warner S. S.
Jamestown A'ways.	F.B.	Taylor J3	Cont. A-40-4
Moore, F. S.	F.B.	Taylor-Young A.	Cont. A-40-4
Moyer, T.	Pvt.	Fairchild F-45	Wr. Wh.
Fridaman & Rhodes	Pvt.	Taylor J3	Cont. A-40-4
Cambridge, F. C.	F.B.	Taylor-Young A.	Cont. A-40-4
Pacific, A. S.	F.B.	Fairchild 24 G De Luxe	Warner S. S.
Sky Lanes, Inc.	F.B.	Taylor J3	Cont. A-40-4
S. Wheeler & B. Penley	F.B.	Taylor-Young A.	Cont. A-40-4
Braman, C. A.	Pvt.	Fairchild 24 G De Luxe	Warner S. S.
McKern, A.	Pvt.	Taylor J3	Cont. A-40-4
Sherman, J.	Pvt.	Taylor-Young A.	Cont. A-40-4
Weddell & Smith	F.B.	Fairchild 24 G De Luxe	Warner S. S.
Stewart & Landy	Pvt.	Taylor J2	Cont. A-40-4
Fox Valley, F. S.	F.B.	Taylor-Young A.	Cont. A-40-4
Johnstone, V.	Pvt.	Fairchild F-45	Wr. Wh.
King & Walker	Pvt.	Taylor J3	Cont. A-40-4
Aircraft, S. & S.	F.B.	Taylor-Young A.	Cont. A-40-4
Snow, C. A.	Pvt.	Beech D17R	Wr 975E-3
Metzger, L. G.	Pvt	Taylor J2	Cont. A-40-4
Southern A'ways.	F.B.	Taylor-Young A.	Cont. A-40-4
Randall, H. T.	Pvt.	Beech E17B	Jacobs L-5
Holmes, F. S.	F.B.	Taylor J2	Cont. A-40-5
Wimer, H.	Pvt.	Taylor-Young A.	Cont. A-40-4
Nat'l. Geophysical Co.	Corp.	Beech D17R	Wr. 975E-3
Trent, G. W.	Pvt.	Taylor J2	Cont. A-40-5
Riviere, P.	Pvt.	Taylor-Young A.	Cont. A-40-4
Cochran, J.	Pvt.	Beech D17W	P & W SC-G Jr.
Becker, A. S.	F.B.	Taylor J2	Cont. A-40-4
Clugston, H.	Pvt.	Taylor-Young A.	Cont. A-40-4
DuPont Airport	F.B.	Beech E17B	Jacobs L-5
Camel City, F. S.	F.B.	Taylor J3	Cont. A-
Springfield, A. Co.	F.B.	Taylor-Young A.	Cont. A-40-4
Hobart, G. A.	Pvt.	Beech SD17S	P & W SB
Patterson A'ways.	F.B.	Taylor J3	Cont. A-40-4
St. Louis Airlines.	F.B.	Taylor-Young A.	Cont. A-40-4
Moore, J. R. B.	Pvt.	Beech E17B	Jacobs L-5
Southern, A. S.	F.B.	Taylor J2	Cont. A-40-4
Air Service, Inc.	F.B.	Taylor-Young A.	Cont. A-40-4
Tom Foster	Pvt.	Beech D17R	Wr 975E-3
Art Whitaker	F.B.	Taylor J3	Cont. A-40-4
Henderson, C.	Pvt.	Taylor-Young A.	Cont. A-40-4
Noordtyn Aircraft (Ex)	F.B.	Beech SE17B	Jacobs L5
McCormick, C. W.	Pvt.	Taylor J3	Cont. A-40-4

School's Open: The doors of the new Aero Industries Technical Institute swung open Sept. 7 to a near-capacity student body of more than 200. The Institute's ultra-modernist buildings occupy a five-acre campus on the north side of Los Angeles. Its executive committee consists of Robt. E. Gross, president of Lockheed; John K. Northrop; C. A. Van Dusen, vice-president of Consolidated.

first aircraft contract. Since then its deliveries to the Navy have been: 49 in 1933; 56 in 1934; 65 in 1935; 57 in 1936. Deliveries to the Coast Guard have been: 8 in 1934; 7 in 1935; 7 in 1936. Last year two planes were also delivered for commercial service and eight shipped for export. So far this year the company has been working on Navy orders for 81 Grumman Fighters, 30 Grumman Utility Amphibians and on commercial orders for 10 of the new twin engined G-21 Grumman Amphibians.

Officers are: L. R. Grumman, L. A. Swirbul, E. W. Poor, J. A. Stamin, and E. C. Towl.

AIRPORTS

THE AIRPORT PROBLEM continues to be one of the most serious facing the development of aviation in America. Last month the WPA released a progress report showing that through June 30, 1937 it had expended $63,710,642 on 940 airport projects. Local governmental sponsors had expended $6,851,544. No less than 89,076,615 man hours of labor had been expended on WPA airports. Yet all over the country public officials are struggling increasingly with problems posed by growing airline traffic, by the increasing field requirements of modern transport designs. From all quarters come reports of towns and cities cut off airlines schedules because their airport facilities have not kept pace.

Last month Harlee Branch, discussing the latter problem, indicated the Post Office plans wherever possible to encourage short local services in smaller planes between towns, whose air mail service has been cancelled for airport reasons, and nearby cities whose facilities are more extensive.

To help city officials better to grasp and attack their airport problems the American Municipal Association will devote a large part of the program of its conference Oct. 13–15 to discussion of this subject. A number of airport and aeronautical experts are scheduled to attend.

Tennessee's new airport bill, which became effective July 1, is expected to produce $1,500 monthly revenue for the Memphis Municipal Airport. Records recently released show that between 35,000 and 45,000 gallons of gasoline are being sold there monthly with a state tax of seven cents on each gallon. Under the new set-up, this tax, instead of going to the State Highway Department, will be divided between the city of Memphis, and the State Airport Commission. All told there are 15 airports under the jurisdiction of the Commission, for which about $70,000 will be available annually. The commission is composed of W. T. Cheek, Nashville, chairman, Marion Sell, Johnson City, and W. Percy McDonald, Memphis.

Grand Island, Nebraska, with its Arrasmith Field, a new $300,000 municipal airport to be dedicated September 28, is looking forward to a place of importance as an air commerce center. The field, which covers 640 acres, has no telephone or power lines near it. Underground placing has been used for all wires. The administration building, 35 by 65 feet, with a glass-enclosed observation room at the top, has just been completed. The hangar is 105 feet high and 150 feet long. Two of the four runways are 100 feet wide and 4,000 feet long, and two are 75 feet wide and 4,200 feet long.

SCHOOLS

Tenth—Everyone was so busy around Parks Air College in August, no one realized the college was passing the tenth anniversary of its founding. Forty-one students completed their Parks training this summer term, all but one of them graduating from two-year courses. A new curiccula, embodying several important changes is described in the new Parks catalogue.

Chapter—A student chapter of the Institute of the aeronautical sciences has been organized at the Boeing School of Aeronautics with E. Allen as chairman; R. D. Speas, Secretary and Bud Striebel, Dick Grow and Bob Meany as the Student Board of Admissions. . . . Boeing school records showed last month that more than 38,000 hours of flight instruction has been given Boeing students throughout the past eight years. . . . A new 1170 sq.ft. science laboratory has been constructed. The engine shop and the radio laboratory have been doubled.

Filled—Casey Jones, president of the Casey Jones School of Aeronautics announces that no further enrollments for the classes in Aeronautical Engineering or Master Mechanics can be accepted until November and December—this being the third year in a row when the school became so full students could be admitted only to replace graduates. The student body now numbers more than 500.

ABROAD

Goodwill—Three Cuban and one Dominican plane will begin a goodwill tour Oct. 12 of Central and South America, Mexico, the United States and Canada. Object: To promote the early construction of a gigantic lighthouse and flying field at Punta Torrecilla, Dominican Republic where Columbus first landed in this hemisphere.

1,000 hours—The de Havilland Aircraft Company has extended the recommended period between overhauls on its Gypsy Major engines to 1,000 hours. When they were first introduced in 1932 the company recommended overhauling each 450 hours; later boosted it to 750.

Without Surcharge—The practice of sending a covering duplicate letter by surface transport for a letter dispatched by air mail has struck a snag in the new "without surcharge" air mail services opened in June by the British to South Africa and the Netherlands to the East Indies. Since all mail now travels by air the super-cautious mailer has now no outlet for his double-checking save to send a second letter by the next plane—thus posing a problem for postal authorities who are battling to prevent unnecessary burdening of the already full equipment.

Missing—Aug. 25 Deutsche Lufthansa reported the first crossing of the Himalaya Mountains carried out by one of its planes, a Junkers JU52. Its flight from Kabul Afghanistan to Kansu thence to Soochow was the first of a series planned for two such ships as a survey of a route to give Germany air transport access to Eastern Asia. Two weeks later came word that one of the ships was missing somewhere among the mountains. Aboard her were Baron Carl von Gablentz, Lufthansa, managing director and veteran of much catapult operating in the Atlantic: Captain Robert Untucht and radio operator Kirchoff. The British Air Ministry had promised aid in the search.

Duce—Premier Mussolini has put the fire under the Italian aircraft industry to get out and design some engines on its own hook. The fact has just been realized that of the four principal Italian aircraft engine factories —Alpha Romeo was building Bristol, de Havilland and Armstrong-Siddley motors. Isotta Fraschini was building Lorrain, Hispano Suiza and Gnome Rhone motors. Piaggio was building Gnome Rhones and Bristols. Fiat was working full out on Pratt & Whitneys.

Came Fourth—The British feel rather well to have placed fourth in the Istre-Damascus-Paris Race which the French government ran off in August as a substitute for the Transatlantic contest our Bureau of Air Commerce put its foot down onto. Three Italian Savoia Marchetti S-79 trimotors led the thirteen starters to the finish line. But Flight Lieut. Clouston put his DH Comet (the same one Scott flew in the MacRobertson) across ahead of five other Italians and all four of the French entries. The Comet with two 200 hp. Gypsy-Six engines had only a sixth the power of the winning Italians. What's more the S-79's had Bristol engines. (Picture on page 23)

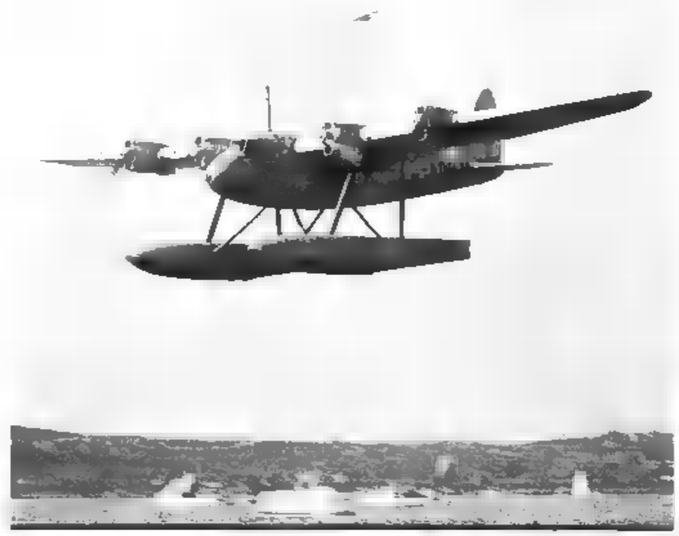
AIRLINES

American—Passenger traffic on American Airlines continued to mount through August. Revenue passenger-miles for that month reached 12,754,327 an increase of 36.8 per cent over August of 1936. Passengers carried reached 32,106 compared with 25,182 for the year previous. Airplane miles were up only 9.6 per cent over August 1936. American Airlines is currently having great difficulty finding girls qualified to fill its vacancies for hostesses.

Eastern—August also meant a new record high in traffic for Eastern Air Lines. Revenue passenger miles stood at 4,175,000 an increase of 33 per cent, over August 1936. Passengers-carried reached 10,365 an increase of 24 per cent. Plane miles were up 16 per cent. . . . Aug. 31 North American Aviation petitioned the ICC to raise basic mail rates on its Eastern Air Lines from 25 to 26 cents per airplane mile. The ICC had fixed such a 26-cent rate for it in 1935 provided monthly mileage did not exceed 145,000. This July an additional round trip its Jacksonville Miami route put Eastern over that limit and dropped its pay rate.

Penn-Central—The National Air Races laid such demands upon Pennsylvania-Central Airlines traffic office that line practically doubled its Detroit, Cleveland, Pittsburgh Washington services, adding 48 extra flights to its regular 56. During the four-day period 1501 passengers were handled.

Express—Organized Air express service in America passed its tenth birthday Sept. 1 amid a shower of new record-breaking traffic statistics. Most important: During the first six months of this year the Railway Express Agency handled 285,346 shipments aggregating 979 tons—a 30.6 per cent increase in tonnage which resulted in a 42.2 per cent use in gross revenue for the period compared with the first half of 1936. As an even finer birthday feature TWA Sept. 1 finally capitulated and joined the nineteen other airlines already in the REA system giving the country, at long last, a uniform air express service. Significant figure: TWA's last announcement of its general Air Express traf-

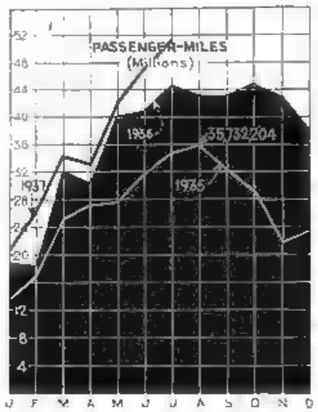


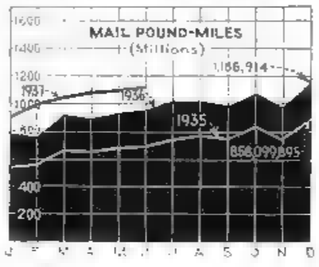
Flight

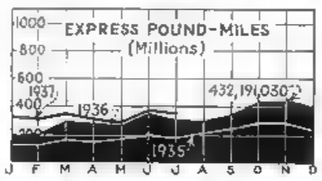
"Upper Component": The top or long-range part of the Mayo Composite transatlantic mail plane in flight tests over the River Medway, England. The "lower component, basically similar to the Short Empire flying boat, is also well along on its flight tests (see page 23 for photo). Combined tests are expected "in the very near future."

Traffic

Latest available statistics from the Bureau of Air Commerce and the Post Office Department—Domestic airlines only.







AIR TRANSPORT INDICATOR

September 1, 1937

115.8

—which is the ratio of revenue passenger miles for August 1937 as compared with the corresponding figure for August 1936.

For July 1937 the indicator stood at 110.2.

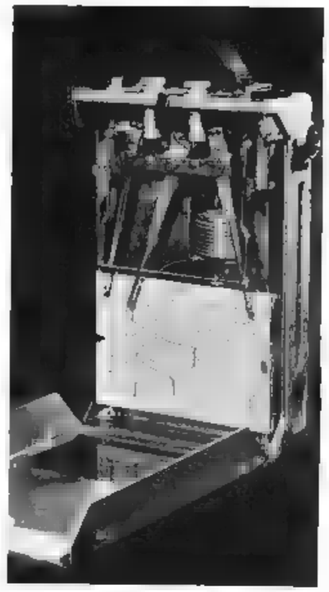
fic showed a gain for the first seven months of this year of only 20 per cent over 1936. Additional Factor: Connections at San Francisco and New York with transoceanic lines will be simplified for TWA now that its express handling agency is identical with Pan American's.

TWA—Even more important to its general set-up than a new express alignment, TWA Sept. 3 opened up the Winslow-San Francisco cut-off, its heart's desire for lo these several years. Few days earlier it had also opened regular service on its new Dayton-Chicago route. By the terms of the contract under which it won them, TWA must carry mail over these routes for one mill per mile for the next three years. To judge from the cheering within TWA ranks, it is only too glad to do so.

United—Most newsworthy of any airline since AVIATION last went to press is United Air Lines. Sept. 1 it too made much of a tenth anniversary—the opening of the first transcontinental passenger service over the routes of its predecessor companies. The Post Office almost ruined the party, however. In recent decisions it decreed (1) That United must discontinue the second schedule via Camden it recently restored over its Newark-Cleveland services; (2) That United's proposed "pooling" of equipment on the Pullman plan with Western Air Express would be illegal and "monopolistic"; (3) That the July transfer of ▬ of United's four daily transcontinental air-mail schedules to American should stand despite Pres. Patterson's protest that it deprived United of $150,000 annually without substantial decrease of the mail loads it would be required to carry. All this added to TWA's entrance into the San Francisco area might have discouraged anyone. Not ▬ United. Reports on August passenger traffic put United back ▬ top of the national heap for the first time since American displaced it last September. Revenue passenger-miles carried totaled 13,400,000 for the period—a new record for United, for the country, for the world.

Accident Reports—The Bureau of Air Commerce last month issued findings by its investigating boards on August's two airline crashes. One of them, that dealing with Eastern's crash at Daytona Beach, Fla., found, "In our opinion the probable cause of this accident was the absence of reasonable notice to those operating and navigating the aircraft that an object (a powerline pole) had been erected which constituted a hazard to the aircraft taking off. Signed by Denis Mulligan, Robert Hazen and George Lassow the report sums up both the airlines and the power company's cases and makes what seems to us the obviously reasonable finding.

The other report, dealing with



Flight Recorder: United Air Lines has equipped 60 of its transports with this instrument which keeps automatic record of altitude, ▬ of the Sperry pilot and radio transmissions.

Pan American-Grace's crash in the Caribbean and signed by Miller Foster, Ed Yuravich and Roy Keeley goes off on ▬ of the queerest tangents ever followed by a post-crash board. The accident, ▬ the board finds, was caused by the plane (a Sikorsky S-43) "striking the water at ▪ speed of not less than 90 miles an hour, tearing the ship to pieces and resulting in the death of all on board . . . fire resulted from the impact with the water." The board gives reasonable arguments deduced from what wreckage was found to back these deductions. It also describes a weather situation and a last radio contact with Pilot Dunn to back one of two "most probable contributing causes" offered—"the encountering of ▪ sudden severe rain, as altitude was being lost by the plane in the spiral descent, resulting in the blanking out of all visual contact." So far ▬ good. What ▬▬ to be the Board's preferred "probable contributing cause," however, is the "failure of one or both engines, due to faulty gasoline system, occurring during the spiraling maneuver." How in the world could they have deduced that from the minor fragments of the ship and its gear they had to study? Inspectors found the fuel systems of other Pan-Grace S-43's modified in a way they did not like. A sister ship had a fuel failure during the inquiry. But admitting this ample basis for assuming fuel cut out, how could engine failure in a spiral glide cause the ship to strike at 90 miles an hour?

Operators' Corner

An exchange of ideas on the problems of the commercial aviation industry

QUESTION 26: The Air Commerce Bureau has been considering the possibility of licensing the ■■■■■ of large airports. What do you think of the idea? To what class of airports should it apply? Is there any standard of qualifications desirable for ■■ airport manager? If so what should the minimum requirement be? Do you think it would be possible ■ ■■ standards for such a position?

Should Be Licensed

I AGREE WITH the Department of Commerce and I think that all municipal airport managers should be licensed to comply with the safety rules of an airport and ruled by the Department of Commerce.—A. J. HARTMAN, *Manager, Burlington Municipal Airport, Burlington, Vt.*

Standards Needed

THERE IS NO QUESTION in my mind but that ■ definite standard of qualifications should be set up for managers of airports at which scheduled airline transport operations are carried on.

Inasmuch ■■ scheduled air transportation is, I believe, the backbone of practically all aviation development, and since the efficient handling of air commerce by this transportation agency is dependent in ■ large measure on the proper development and efficient operation of the nation's airports, certainly the men in charge of such activities should be sufficiently experienced to competently administer their duties. How such qualifications can be set up is a matter that will require considerable study.

Airports, and particularly air transport fields, are representing each year ■ larger and larger investment of public monies in both physical equipment and operations, and as such, demand not only excellent business management, but also vision in planning for future development, which I feel can only be attained through a broad experience in the field of aviation. Experience ■■ a pilot, I believe, is an advantage in recognizing many problems of operation, but I do not think it is essential, particularly where ■■ individual has had close connection with the sales or engineering end of aviation and if he possesses executive ability.

I believe, however, that an open discussion of such a question in your magazine may be of great interest and of decided help to individuals like myself who are vitally concerned in proper airport management and development.—B. M. DOOLIN, *Manager, San Francisco Airport Department.*

Civil Service Necessary

I WAS QUITE THRILLED at the bright idea of licensing airport managers.

My first viewpoint or reaction to the idea would be to license managers of airports under Federal Control, but in cases where the airport is constructed and operated by a municipality or state I see no reason why the Federal Government (meaning the Bureau of Air Commerce) should exer■■■ the right to license officials or field personnel. This would be unconstitutional as a violation of states rights.

Secondly, if airport managers are to be singled out of ■ few major airports and compelled to be licensed, it would be unjust to apply the regulation to ■ few if all airport managers operating commercial enterprises and public airport facilities were not included in the standardization. The regulation should apply to all classes and ratings of airports where federal rules and regulations apply, in respect to federal licensed aircraft. What we really need in the United States is an established standardized set of rules and regulations governing all airports and barring none. At this time I do not believe there are two airports operating under the suggested rules and regulations of the Bureau of Air Commerce. In other words standardize regulations governing all airports first, then work ■■ the airport managers. There are no two airport managers who will agree and state that the other fellow is right in his policy of airport management. Probably we are all wrong.

Under the present set-up the visiting pilot must be re-educated to the rules and regulations governing each individual airport. No reference library is small enough to carry in the aircraft in order that the pilot may refer to it to find the rules governing this airport as he prepares to land.

At Oakland, we are fortunate in being able to adapt the suggested air commerce rules governing airports and that is the reason for our smooth and efficient control of air traffic in and about the airport. Thus there is no conflict with the air commerce regulations as set aside by the Bureau of Air Commerce ■■ the Air Commerce Act of 1926 accordingly. Therefore there is excellent cooperative spirit at Oakland between air commerce officials and the management.

At present I know of no standard qualifications desirable for an airport manager. However, you will no doubt receive suggestions from every pilot and operator in the industry. The minimum requirements should be based on experience in personnel administration, executive ability, and five years or more as an attendant or assistant airport superintendent. The latter is a promotional position from airport attendant with five years or more experience required. Personality, good judgment and diplomacy are necessary at all times. Politics must be ruled out. The position should be created under Civil Service and competitive examinations held to qualify personnel for appointment to superintendent and assistant superintendent.—GUY TURNER, *Superintendent, Oakland Municipal Airport, Oakland, Calif.*

Next Month's Question

QUESTION 27: What has been your experi■■■ in selling airplanes ■ prospects who carry substantial life insurance? Have you found ■■ ratings put ■■ private pilots productive of sales resistance? What methods have you used to overcome the difficulties resulting from this condition?

Chasing the Sheriff

(*Continued from page 31*)

eran craftsmen who have been associated with the business for many years. We service twenty-two resident customers, as many more transients per month, and of course, our own equipment. We operate on a twenty-four hour schedule and maintain a standard in our service work comparable and in many cases better than that of the airlines. The interesting part of this is that it is required by our customers. It is very difficult to do business with the entire trade, because obviously the standards which will satisfy one group will be entirely below the ideas of another. The bridging of this gap is the hardest problem of service men today. To do business in a big plant means overhead. The "little fellow" refuses to recognize it; the larger operator, the corporation, and the business man all know that it exists and face it. Our shop does not only consist of an engine and repair base, but we hold distributorships and have factory trained personnel for the recognized manufacturers of propellers, instruments, and other accessories upon which the successful operation of an airplane depends. We are an Approved Repair base for the repair and overhaul of pontoons and float gear. Some twenty ships have had floats installed at our shop during this season, the accessibility of this location being ideal for the changeover. In short, our facilities are adequately suited to any service needs.

Our Store now distributes some four thousand items through both wholesale and retail channels. I was amazed to find that I could even buy an electric razor the other day. To some this may seem superfluous, but I remember reading an article by one of the largest fixed base operators on the coast which stated that one of the biggest attractions to the field and his hangars was the curiosity shop for the sale of odd things. It was set up in the lobby of his administration building. We haven't gone to quite that extent, but we do have attractive show windows, and we do make it possible for people connected with aviation and others who may drop in to buy many different products from us, adding to our volume and helping to support our buying medium. The store itself is distributor for all of the nationally known aviation products, parts, and accessories. Our hangar service is concerned with giving the best possible attention to our regular customers and the transients who come in. Added to that is the problem of cooperating with the flying operations in having ships ready for regular appointments. Gas and oil sales are handled through this department. It is run on a shift basis so that adequate personnel will be available during the entire day and night. Space is at a premium at our field; consistently we must tie out our own ships in order to make room for customers. During the past three months we have been housing, or attempting to house, forty to fifty ships nightly.

Boston is ideally suited for seaplane operation and its facilities are unsurpassed. It is not unusual for us to beach a seaplane, wash it down, and have it stored away within fifteen minutes of the instant the ship touches the water. Launching is an even simpler detail. We use large four

(*Turn to page 72*)

The man who chased the sheriff and the men he put to work

Believe in Santa Claus. This window display attracted many customers during the Christmas season.

Chasing the Sheriff

(*Continued from page 70*)

wheel dollies which are steerable. On these we taxi the ships under their own power permitting a short period of warm up while enroute to the ramp. The minute the seaplane leaves the dolly to float away it is ready for takeoff.

The crew in charge of these servicing problems must be well trained. The greatest mistake many operators make is that of hiring young and inexperienced men to handle their own and customers' airplanes. The resultant accumulation of small "hangar crashes" points to only one thing—inexperience in parking and handling ships on the ground. To this end we have set up a separate department and have designated a line of authority and responsibility among the personnel, thereby keeping this difficulty at a minimum.

The latest and newest department upon which we have concentrated our efforts at Boston has been that of New Sales. Since Boston is the business center of the New England States, it is only logical that manufacturers look to this city for adequate means to distribute their products. With this in view we have been successful in getting three manufacturers whose products are admirably suited to New England flying—Stinson, Fairchild, and Aeronca—to distribute through us. We feel that the ships which we represent cover the field because of the name and reputation of the firms behind them as well as because of their performance. Sales, we have learned, are dependent upon the effort put into them. We now subscribe to the idea of setting aside a demonstrator for the purpose of making actual demonstrations continuously at various points in our territory. Previously a ship was taken out of the charter business for a short time to jump up to some field for a demonstration. The man was usually not very impressed with the hurried departure in order to get the ship back into the charter business again. He also may have seen some dirty scratches or faded upholstery. We find that the initial appearance has a marked effect on the buyer. Consequently, we have definitely leaned toward the idea of keeping a ship ready for demonstration at a moment's notice. Sales volume has come up to a marked degree under this policy, by over three hundred per cent as compared to that of a year ago. We feel that this is the result of intensive sales effort, rather than solely to the upturn in businesses during the past year.

In conclusion, perhaps I have seemed too serious in the manner of describing our operation and how it can be accomplished, but a serious thought occurs when we reminisce and realize that we were in an awful hole, with two huge pill boxes and no business, and now it seems as though the light is about to shine. We find ourselves with fifteen airplanes and fifty people, students from sixteen to sixty, charters from local hops to Texas treks, distributorships for light planes and luxury planes, repair jobs from adjustments to crack-ups, supplies from aviation jewelry to controllable propellers, Aeroncas to Electras in storage—all this combined in one single aeronautical organization.

To New England Aviation—"The Butcher, the Baker, the Candlestick-maker."

Buyers' Log Book

(*Continued from page 53*)

Window Shopping—

Aids in the form of recently published catalogues

INTERESTING, informative, illustrated catalogs have recently come to the Editors of AVIATION from the firms listed below. These publications will be forwarded to any member of the aviation industry who writes directly to the manufacturer:

BONNEY FORGE & TOOL WORKS, Allentown, Penna.

Bonney Tools—Catalog No. 137—A sixty-four page catalog listing the line of Bonney hand tools.

THE CATERPILLAR TRACTOR COMPANY, Peoria, Ill.

The Cavalcade of Diesel—A fascinating illustrated story of Diesel development told in 24 pages by John B. Kennedy.

EX-CELL-O AIRCRAFT & TOOL CORP., Detroit, Michigan.

Tool Tips—Monthly Ex-Cell-O Magazine of interest to everyone doing machine work.

THE B. F. GOODRICH COMPANY, Akron, Ohio.

Latest *data sheets* on Goodrich airplane tires and tubes.

HAYNES STELLITE COMPANY, Kokomo, Indiana.

Haynes Stellite J-Metal Cutting Tools—A 52-page illustrated catalog of Stellite tools and how to use them to advantage.

Millers Falls Drill

"Dyno-Mite" Drill —

by Millers Falls is small and light in weight

Since most of the man-hours devoted to the production of modern American planes is spent in drilling little holes in pieces of metal there is special significance in the "Dyno-Mite" featherweight hand drill offered by the Millers Falls Company of Greenfield, Mass. Called the world's smallest ¼ in. production drill, the Dyno-Mite operates on AC or DC current of 110 or 220 volts. Weight is only 2½ lb. and dimensions are 8 in. long by 2½ in. wide.—AVIATION, *October, 1937.*

An Airport Plan

(Continued from page 27)

quirements which include sufficiently clear air approaches and the necessary provisions on the landing area for plane landings and take-offs at all seasons of the year and in all kinds of weather, the most vital remaining problem is that of adequate *circulation* for plane traffic, passengers and

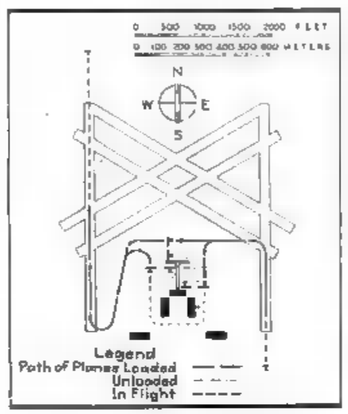


Fig. 6. Plane circulation, ■ wind

freight at the loading points and through the station and of automobile traffic. Provision must be made for a free movement of ■ large volume of air traffic arriving and departing on schedule unchecked and unhampered by the confusion following a congestion of its various categories of surface traffic. Since the airport is, essentially, the connecting link and acts as a kind of thoroughfare between surface and air transportation therefor a continuous and free flow of traffic of all categories is the most vital of all airport planning requirements.

The accompanying diagrams illustrate the system of airport expansion and of airport circulation. Other features and advantages of the airport layout will become apparent from the following description:

Runway Layout. The runways are grouped mainly at one end and along the adjacent sides of the airport thus forming a minimum of small unusable portions of the landing area and providing at the other end large and convenient areas for the expansion of the ground facilities and for the manoeuvring of planes at the loading platforms: that portion of the airport where greatest traffic density and traffic congestion occurs.

Plane Loading Platforms. (See Fig. 1.) Two plane loading platforms T and T'T' are provided which are centrally located with respect to the runways, platform-T'T' being used by *through* plane traffic while platform-T is used for what may be called *Terminal* plane traffic, that is for transport planes which start or terminate their flight at the airport. Express planes and planes carrying mail would normally use platform-T'T' while platform-T would be normally used by the slower freight carrying planes. This differentiation of plane traffic and the way the platforms accommodate them are shown by the plane traffic diagrams, Figures 6-9 inclusive. Thus *through* plane traffic making merely an intermediate stop is enabled to quickly clear the airport by use of platform-T'T' while *Terminal* plane traffic by using platform-T is able on terminating its run to discharge all passengers and freight and to proceed without cross circula-

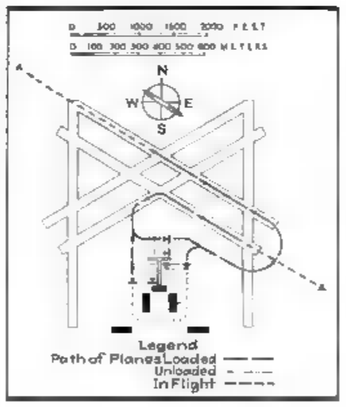


Fig. 7. Plane circulation, NW wind

tion to the hangars for maintenance or storage.

Lateral-Plane-Conveyors. In order to accommodate a maximum number of planes at a concentrated passenger platform and to control plane docking at the loading platforms with despatch, tracks C (Figure 1.) are provided on which travel cars or conveyors for supporting and moving the planes sideways, or at right angles to their normal line of flight, to points adjacent the passenger loading platforms. Thereby all turning of planes near embarking and disembarking platforms is eliminated, each plane is free to approach and leave the platforms independently of others, aircraft operation on the airport is accelerated and the motors of planes may be temporarily shut off before the planes approach the passenger platforms thus avoiding danger of injury by propellors, noise of engines, the necessity of the passengers passing through the plane slip stream in embarking and disembarking and the driving of dirt on passengers and other planes is eliminated.

Airport Building Layout. Due to the centralization of the plane loading platform and hangars the taxiing distances to and from the ends of the runways are reduced to ■ minimum as well as the distances between the hangars and the platforms, while at the same time, the hangars and the station are not only accessible to the parking area, and the latter to the roadway by which vehicles approach the airport, but the buildings do not interfere with planes operating on the runways.

Plane Roadway and Parking Area. The parking area and space for vehicular traffic V (Fig. 1.) is centrally located with respect to the airport buildings. In order to avoid interference between automobile traffic and the taxiing of unloaded planes along the roadway XX', an underpass YY' for vehicular traffic is provided extending from a point outside the airport to the parking area V, underneath the roadway XX'. It will be appreciated that the underpass is not essential (although it would improve plane and automobile traffic circulation) since most of the

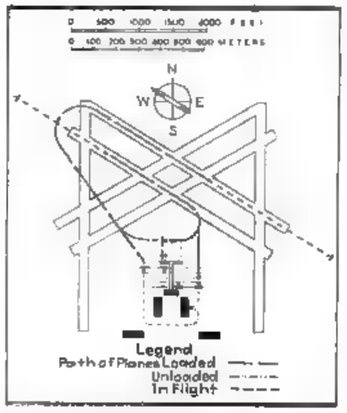


Fig. 8. Plane circulation, ■ wind

advantages of the roadway XX' would be secured by alternately allowing planes to pass along the road XX' and vehicles to cross it.

Separation of the Ground Facilities of Various Types of Flying.

Until such time as commercial airports are strictly reserved to commercial plane operation, it may be found necessary to accommodate various categories of flying,—commercial, private, National Guard, etc., at the same airport. Fig. 1. illustrates how the needed segregation and the independent operation of various classes of flying can be affected; hangars 1 and 2, for example could be used for scheduled transport operation, hangar 3 for National Guard and hangar 4 for private planes. Thus National Guard and private plane operation would have the benefits of an airport plan eliminating cross circulation of planes taxiing on the airport yet would not interfere with and could operate independently of scheduled transport and taxi planes using the airway station and loading platforms.

Summary of the Characteristics of the Wood-System.

I. The runway and airport building layout provides for:

1. Separate runways for simultaneous take-offs and landings.
2. Centralization of airport buildings with respect to each other and to the runways.
3. Relatively short taxiing distance to and from buildings and runways and between station and hangars.
4. Large areas for plane manoeuvring at station and hangars and space for expansion of ground facilities.
5. Parking space centrally located with respect to airport buildings.
6. A system of gradual expansion of ground facilities to develop the airport to its maximum capacity without the necessity of demolishing or moving any existing units.

II. The loading platforms and lateral-plane-conveyors provide for:

1. A wide angle of approach to loading platforms for incoming and outgoing plane traffic.
2. An elimination of the turning of planes at the loading platforms.
3. An elimination at the loading platforms of the noise of plane motors and of the slip stream blast.
4. The independent movement of planes ■ and from the loading platforms.
5. The loading and unloading of a large ■ber of planes simultaneously.
6. Separate platforms for incoming and outgoing through and terminal plane traffic and separate platforms for outgoing and incoming terminal passenger traffic.
7. A passenger platform layout which completely separates incoming and outgoing passenger traffic.
8. Protection from the weather for passengers transferring between planes which makes it

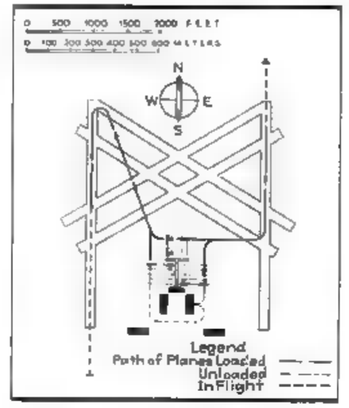


Fig. 9. Plane circulation, S wind

unnecessary for them to pass through the station,

III. The system for plane circulation on the airport provides for:

1. An easily followed standardized plane circulation.
2. Elimination of cross-circulation of traffic ■ the airport.
3. The circulation of a large volume of plane and passenger traffic with maximum safety and minimum waste motion.

Conclusion. A good deal of study has been given in the past to the various operations necessary to the adequate preparation of the landing area, while the comprehensive planning of the airport, although it forms the backbone and foundation of the whole airport program, has been strangely neglected. The result has frequently been wasted capital and ineffective airports. The more important airports are not only experiencing serious traffic congestion today, but they lack any of the necessary attributes to accommodate the vast volume of commercial air traffic which is coming. A first hand study of 70 airports in twenty countries has shown the writer that this condition is general not only in this country but in Europe.

The construction of a first class airport requires the close collaboration from the outset of the airport committee or other representative of the community, air transportation experts, city planners, architects and engineers if the port is to function efficiently as ■ unit and in its relation to other airports and with road, rail and ship transportation. The requirements of air transportation companies and of the Bureau of Air Commerce must be adequately met in order to provide for the necessary flight and transportation requirements. To aid in the selection of the airport site the advice of city planners is necessary if the airport is to form an integral part of existing and proposed city, highway and rail development. The collaboration of engineers expert in grading, drainage, runway construction and lighting is needed if these problems are to be satisfactorily solved. Finally, the whole airport program and its construction must be co-ordinated by being based from the outset on the comprehensive planning of the whole airport layout and of the buildings. This requires the knowledge of the architect whose most essential skill is in planning—a field in which he has received special training.

Radio on Empire Routes

(Continued from page 33)

working from 12 to 24 volts and generating 30 milli-amps at 180 volts.

The two transmitters, receiver and D.F. equipment and aerials weigh approximately 133 lb. The engine generator-dynamotor set 111½ lb.

As may be expected, complete radio shielding of engine, ignition system generator and all electric wiring and connections has been very thoroughly carried out. Marconi engine shielding harness has now been adopted by Imperial Airways, complete bonding and shielding of all electrical wiring and apparatus being essential, especially for short wave work.

Very shortly *Cavalier*, one of the 18-ton Empire flying boats will be pioneering the Bermuda-New York commuting service. *Cavalier* has comfortable cabin accommodations for passengers and ample baggage and mail space. A crew of four—Captain, First Officer, Radio Operator, and Steward will probably be carried.

In *Cavalier*, as in the other long range boats, the two transmitters cover a waveband of 500 to 1000 meters (600-300 kcs) and 95 to 195 meters on short waves (3158-1540 kcs). Both wavebands can be used for C.W. telephony or telegraphy, or I.C.W. telegraphy.

The receivers work on 300 to 450 meters and 600 to 2000 meters with D.F. on the 600 to 2000 meters. The short wave receiver covers 15 to 100 meters with a "spot" wave at 183 meters (1639 kcs) for D.F. with Pan American Airways. In addition, a separate receiver for the 600 to 1550 meter band will be carried and can be used to receive the U. S. Department of Commerce range beacons.

Race Roundup

(*Continued from page 25*)

especially when one considers that Kling was using the Super-Buccaneer engine rated at ■ maximum of 290 h.p. for take off. Wittman finished the race with one propeller tip badly bent, indicating collision with a bird on the seventeenth lap and no doubt causing sufficient vibration to loosen up the Curtiss D-12 engine and cause it to throw oil badly. In this connection Kling's victory was impressive, in the first place because the builders of inverted in-line engines have always claimed that such oil as did leak out was thrown away along the bottom of the fuselage and so did not obscure pilot vision, and secondly because Kling's engine came in dry as a bone at the conclusion of both the Greve and Thompson.

On the other hand proponents of in-line engines may well give consideration to the fact that this year three out of the first four place winners in the Thompson Trophy were powered with Pratt & Whitney Twin Wasp engines. This is ■ complete reversal of 1936 results at Los Angeles, where the inline engines took five out of the first six places in the Thompson Trophy. This showing of the radials in the Thompson Trophy plus the clean sweep of the Bendix by Pratt & Whitney radial equipment, confirms the well known ability of modern American radials to satisfactorily produce power far beyond normal for extended periods. The remarkable showing of the Curtiss D-12 water cooled Vee engine used by Wittman gives further indication that the challenge of the air-cooled inlines will not pass undisputed.

Proponents of completely streamlined cantilever racers were given ■ temporary setback this year by the performances of Wittman's two wire braced monoplanes with fixed landing gear, and by Turner's Meteor with its fixed landing gear. This confirms well established thought that the individual designer is of more influence on the solution of ■ particular design problem, than is the blind following of any particular design formula. In the long run, however, it must be noted that all but one of the feature races, including the Bendix, Greve, and Thompson Trophy events, were captured by cantilever monoplanes with retractable landing gear. The single exception was Wittman's win in the 397 cu. in. race.

The two Wittman racers are similar in design, both incorporating many features of merit, one of which is not good looks. They both employ a unique landing gear which suggests possibilities for commercial application. This gear consists of a single piece of spring steel properly shaped into an inverted "U" and with tapered legs. This is loosely attached at the lower fuselage longerons and wheels are bolted to the lower ends of each leg. The result is ■ gear of maximum "cleanness," relatively cheap to build, and which demonstrated excellent ground handling characteristics. Both of Wittman's planes use wire braced thin wings of low aspect ratio. The smaller Wittman is powered with a Menasco C4S and the big Wittman with a Curtiss D-12. The latter plane is fitted with a novel ▬ radiator mounted directly back of the very large and hollow propeller spinner through which cooling air is fed by means of an integral fan. The little Wittman turned in the really astonishing time of 245.325 m.p.h. around the 5 mile course in the 397 cu. in. feature race. This was some 14 m.p.h. better than the best previous race speed in this class and 30 m.p.h. better than Wittman's best previous speed with the same plane. As Wittman's engine was identical with two or three other Menascos in the same group there is still some question as to exactly which design features on his plane have produced the relatively high speed. Wittman's big racer was easily the fastest on the field, qualifying at 259.108 officially, and turning in approximately 275 m.p.h. in unofficial Thompson trials.

Much interest attached to the new Turner "Meteor," which has been generally hailed as a potential landplane speed record breaker. Turner may have held his speed down at Cleveland with the thought of staging ■ winning sprint in the last two laps, but the indication was that his plane was no as fast as expected. Of beautiful construction, Turner's midwing racer has a cantilever wing and landing gear. Originally built in Los Angeles by Lawrence W. Brown, it has since been revamped by Mattie Laird, and fits a Twin Wasp engine. Ortman's Twin Wasp Jr. powered rebuilt Rider, entered by H. W. Marcoux, did not meet advance hopes, though its record of taking second last year in the Thompson Trophy and second this year in both the Bendix and Thompson is good. It follows traditional Rider design, with cantilever wing, retractable gear.

One of the most interesting race planes on the field was the new Folkerts flown by Rudy Kling. And almost exact duplicate of the first Folkerts which was such a sensation at Los Angeles in 1936, Kling's "Speed King", mounted the more powerful Menasco Super Buccaneer engine. Design is that of a semi-high wing cantilever monoplane with fully retractable landing gear. As with the first Folkerts, Kling's plane showed admirable flying and ground handling qualities getting on and off nicely, and flying smoothly both on the straightaways and pylons. Other new planes included the low wing racer built by Frank Haines which resembled previous Rider racers; and the Delgado Flash, built by the Delgado Trade Schools. The latter plane followed the customary cantilever low-wing design pattern, with Menasco Super Buccaneer engine, but was equipped with ■ fixed landing gear. Apparently a little oversize for its class, the Delgado Flash was not especially fast. For its power the H-W Special, with Amercian Cirrus engine, did quite well, and the Schoenfeldt-Rider racer placed in the Thompson Trophy for the second succesive year.

"Engineering for Speed"—An interesting experiment tried out this year at Cleveland was a meeting on the general theme, "Engineering for Speed", arranged by Major Lester D. Gardner of the Institute of the

(*Turn to page 78*)

EQUIPMENT AND MATERIAL—
that rode with Rudy Kling ■ he took the Thompson Trophy

On the plane: Aeromarine tachometer, oil temperature and manifold pressure gages; Pioneer air speed indicator and wobble pump; Western Electric head temperature gage; General Streamline tires; Ohio seamless steel tubing; Flightex fabric; Berry Brothers dope; Martin Senour cowling enamel; American Steel and Wire cables; Formica pulleys; Imperial Brass hardware and plumbing; Fahlin propeller; Timken wheel bearings; American Stock Gear retractible landing gearing; Autofan wheels; Algoma plywood; Pike Dial spruce.

On the engine: B.G. sparkplugs; Wyman-Gordon crank shaft; Stromberg ▬ buretors; Sealed Power piston rings; Pesco pump; Packard Electric cable; Eclipse starter; Scintilla magneto; Indiana gears; Romec pump; Thompson valves; Evans pump; Cuno oil filter; Victor & Goetz gaskets; SKF, Norma Hoffman, and Fafnir ball bearings; Federal Mogul and Johnson bronze bearings; Connecticut Electric accessories; other materials by Arrowhead Steel, Billings and Spencer, Warman Steel, Jadson Products, Muskegan Motors, Cleveland Wire, American Forge, Bethlehem Steel, Ludlum Steel, Aluminum Company of America, Dow Chemical, American Brass, and J. H. Williams; Gulf gasoline and oil.

(Continued from page 76)

Aeronautical Sciences. Scene was the Hotel Cleveland's Rose Room. Time: Saturday morning, September 4. Present were some eighty listeners, representing a fair cross-section of the aviation industry. Absent to ■ man were the plane builders and pilots taking part in the races. Regrettable this, for they definitely could have contributed much to the discussion.

Richard W. Palmer, of Hughes Aircraft Company, started the ball rolling with a discussion of design for speed, pointing out particularly, that theoretical consideration indicated that for pylon racing, aspect ratio was an important consideration that has usually been overlooked.

On the power plant problem, Robert Insley of Pratt & Whitney, saw very little influence on engine development from air racing. The real "bugs" are worked out on test benches, and at best, race results simply furnish supplemental information. To him the chief value in the races was not to furnish inspiration and information to designers, but rather to make public demonstration of design progress. Racing may point up dramatically an angle that might not be immediately apparent by cold scientific reporting. Thus, although the results of the 1936 races were completely valueless, quantitatively, they caused more speculation on the value of reduced frontal area than might have been produced by a dozen scholarly and conclusive N.A.C.A. reports.

In countries where governments have posted large enough rewards for absolute speed, engine development has profited. For example, present-day British pursuit airplanes are powered by engines that sprang from the Napier and Rolls Royce Schneider engines, and no more powerful and compact engine has ever been built than the Fiat 24-cylinder, tandem Vee that powered the record-breaking Macchi. Present U. S. racing conditions involve nothing that would even remotely foster such development, Insley thought, and although a specification might easily be written for the ultimate "tops" in racing engines, it is obvious that such an engine would have no commercial or military value and certainly no engine manufacturer is likely to build such an engine on speculation. Very likely the high output engine will tend toward combinations of relatively large numbers of small cylinders, delivering somewhat in excess of 1¼ hp. per cu.in., but whether these cylinders should be disposed radially, in-line, or in a series of radial or in-line banks, is something that time alone must decide.

Obviously the high output of racing engines depends as much on proper fuel and lubricant as on design and material. F. F. Zimmerman of Shell, in discussing the problem, showed whereas early racing engines were operated on ethyl blended aviation gasoline of about 88 octane number, present engines are operated on 100 octane fuel similar to the latest U. S. Army Air Corps fuel. When operated with this type fuel, the only limitation placed on engine output is the strength of the engine parts, as the danger of detonation is eliminated.

Special fuel used in foreign aircraft engines was also described with the observation that such fuels would probably be of little use in the present-day, hot-running engines. At present, iso-octane is the principal constituent of 100 octane fuel, and the possibilities were explained of using toluene and di-iso-propyl ether in making such fuel.

Frank Caldwell of Hamilton Standard, taking up the propellor end of the power plant, mentioned that the steadily increasing engine power would soon force the adoption of four or even six bladed propellers. He thought that the multi-bladed type would show relatively little loss in efficiency but would naturally cost considerable in increased weight. He touched also on the problem of torque elimination in racers by the use of co-axial propellers of opposite rotation.

Edmund T. Allen, in a paper on "Piloting", waded right into the problem of "Does air racing tend to improve the breed?" He concluded that race design has been far surpassed by the commercial and the military. Said he: "If there were less emphasis on the daredevil and more on the engineering skill to produce speed safely, we would progress more surely and more rapidly."

Final paper of the session was by T. P. Wright, Director of Engineering for Curtiss-Wright. In handling the "economic aspects of speed", he went into the "why" rather than the "how" which had been the theme of previous speakers. He acknowledged the indebtedness of designers to certain developments from racing in the past, then departed from the racing problem to develop formulas for the evaluation of the worth of speed in commercial transport. From the consumer's angle, he concluded that travel by air (on commercial air lines) was worthwhile for business travelers receiving salaries of over $2,300 a year when traveling distances greater than 100 miles. For the producer of aircraft, "it is worthwhile to gain one additional mile per hour in cruising speed, if this can be obtained by expenditure of $3,000 in the experimental airplane and $1,000 in the production article."

Super Buccaneer

(Continued from page 42)

ternally dry as the proverbial bone.

All accessories on the Super Buccaneer, including the supercharger, are grouped conveniently at the rear of the engine. The supercharger is of the vaneless centrifugal diffusion type, using a single vaned wheel drawing the mixture through the carburetor and feeding it into a single collector scroll communicating with the simple induction pipe which feeds all cylinders. It is claimed that this method of supercharging serves effectively as an inter-cooler, permitting high manifold pressures without heating.

All gears and bearings and wearing surfaces are generously proportioned and the performance of this engine at Cleveland supports the manufacturer's statement that it is an unusually rugged powerplant. As a number of airplane manufacturers are known to be designing or building planes to use the new Super Buccaneer engine we will probably have the opportunity soon of appraising the worth of this engine in ordinary commercial service.

Specifications as supplied by the manufacturer are:

■ cylinder, inverted, in-line, air cooled, supercharged.

250 h.p. at 2350 r.p.m. at 5,000 ft. altitude. 290 h.p. for take off. Bore 4¾ in., stroke 5⅜ in., compression ratio 5.5 to 1, displacement 544 ■ in., dry weight 534 lbs. (without side air scoop, fuel pump or propeller hub), weight of side air scoop ■ lbs. Prop. hub end SAE #20 spline. Length overall 69-13/16 in., height overall 30-19/32 in., width overall to centerline of mounting bolts 12⅞ in., max. width ■ magneto mounting pads 16¾ in.

Standard equipment: includes engine complete with two Scintilla MN-6-¾-DF magnetos, Stromberg NA-R9A carburetor, BG spark plugs, stainless steel exhaust flanges, propeller hub mounting cones, nut and steel snap-ring, inter-cylinder baffles and side air scoop, tool kit and instruction manual.

Extra equipment furnished on order: Fuel pump, starter, generator, machine gun synchronizers, special external oil pump for feeding accessories not part of the regular oil system of the engine, hub for wood propeller, oil gauges, temperature gauges, ignition switches, cylinder head air scoop, radio shielding or radio shielded spark plugs, air pump, tachometer, Cuno self cleaning oil filter, vacuum pump, hydro control governor adapter for constant speed propeller.

How often do you gain heart-felt approval of what you say? How effective is your everyday conversation? Are people ▬ over to you when you talk?

Because relations with people are so large a part of your daily life, in business and social activities, the ability to talk is your most important asset in keeping these relations smooth and in winning people over to your ideas. And the better you talk, the greater will be your success.

"I say without hesitation, this is the best book on conversation ▬ written." — ALBERT EDWARD WIGGAM

"Will help all who wish to be able ■ carry on an interesting conversation." —*Liberty*

Milton Wright's

THE ART OF CONVERSATION

And How to Apply Its Technique

Already in its fourth big printing—$2.50

IF you would win an argument or win a wife, cultivate ■ friend ▬ humble an enemy, get information or give it, ask a favor or deny one, land ■ job, sell ■ bill of goods, be elected ▬ office—if you would accomplish anything, ▬ work or at play, where you are in the presence of other human beings, then you must talk.

So that you may learn how to talk to the best advantage in any situation, Milton Wright has written this book. He shows you—not merely tells you, but *shows* you—how to start a conversation, how to keep it going, how to direct it the way you want it to go, how to make precisely the impression you want ▬ make and get exactly the result you want. He analyzes repartee and shows ▬ how to develop facility in using it. He takes actual conversations apart and shows you what makes them tick.

Mr. Wright's book is firmly grounded in psychology and is written in his easy-to-read style. You can't help setting yourself in the places of the people who do the talking, and when you've laid down the book, you want to go out and practice on your friends. It's a fascinating book—interesting, practical, and really helpful.

How to acquire the ability to talk— *readily entertainingly convincingly*

Are people won over to you when ▬ talk? They will be if you understand and apply the technique of conversation. This book is a brass-tack analysis of talk today—its principles—its techniques. It is a fascinating, practical discussion of simple exercises which will improve everyday conversation.

How would you work out these problems?

—How would you keep up the interest of a group for fifteen minutes in a topic selected by you? (See page 28)

—How would you discover a special interest of ■ person you have met for the first time? (See page 74)

—What steps would you take in a talk with just ▬ other person ■ insure his wanting to talk with you again? (See page 111)

—How would you start, keep moving, and control the conversation at ■ dinner party of six? (See page 149)

10 days' Examination

Send this Coupon

TRY WRIGHT'S METHODS FREE

Check the list of conversational offenses on page 320; ▬ how plainly Wright shows how to overcome these faults. You can make this test, read Wright's book, put his method right into practice, without obligation, simply by mailing the coupon. Take this practical way ▬ see just what the book offers you. Mail the coupon today.

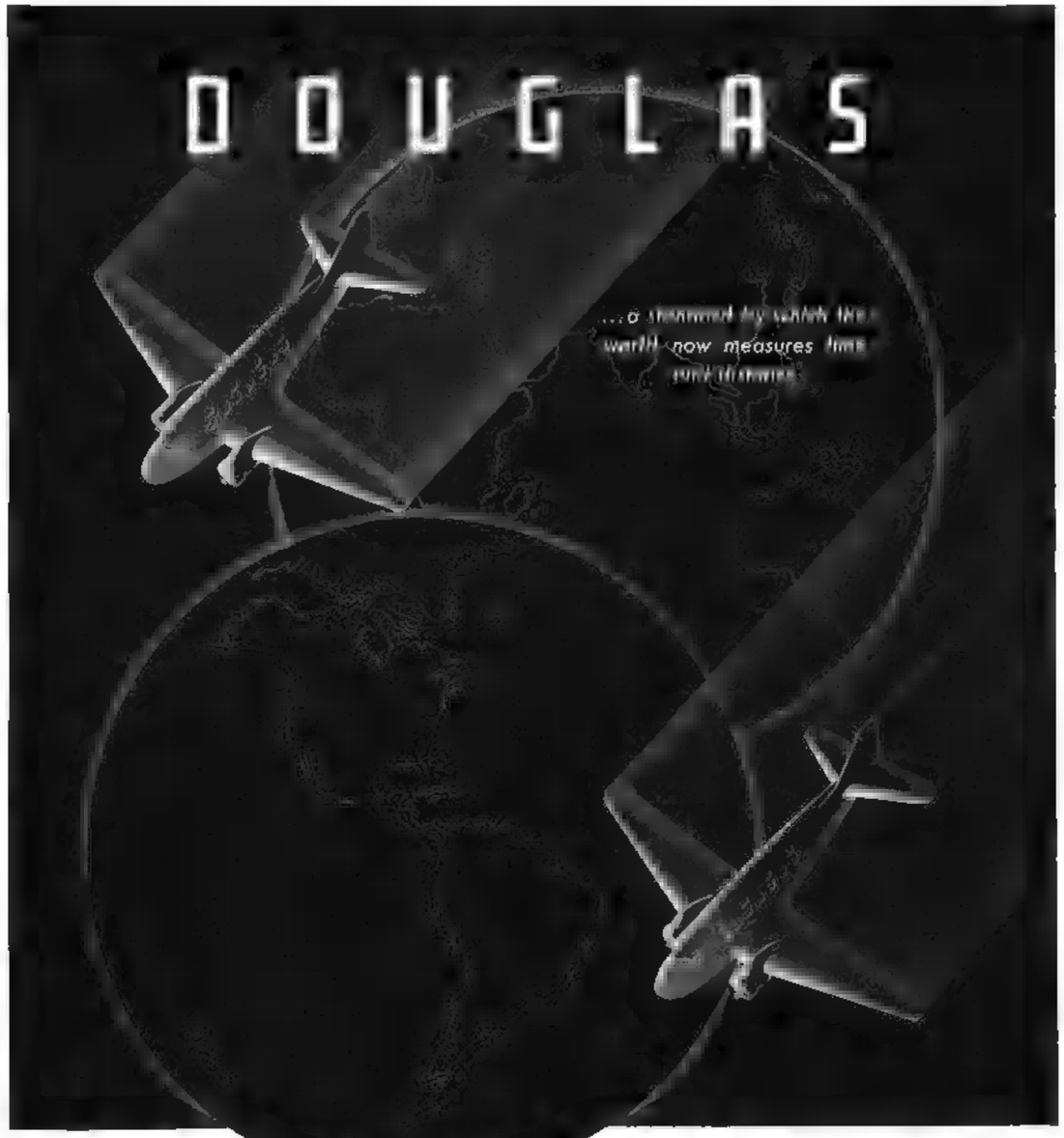
McGraw-Hill Book Co., Inc., ▬ W. 42nd St., N. Y. C.
Send me Wright's The Art of Conversation for ■ days' examination on approval. In 10 days I will ▬ $2.50, plus few ▬ postage, or return book postpaid. (Postage paid on orders accompanied by remittance.)

Name .....

Address .....*Position* .....

City and State.....*Company* .....

(Books sent on approval in U. S. and Canada only.) Av.10-37



FROM "here to there" almost everywhere the way to go fastest and in greatest comfort is via Douglas airliners. Throughout the world airlines fly more Douglas planes more miles than any other type of equipment. First around the world in 1924, now Douglas air fleets fly a distance equal to 4½ times around the world every day! DOUGLAS AIRCRAFT CO., INC., Santa Monica, California.

GO "DOUGLAS" WHEREVER YOU TRAVEL THROUGHOUT THE WORLD

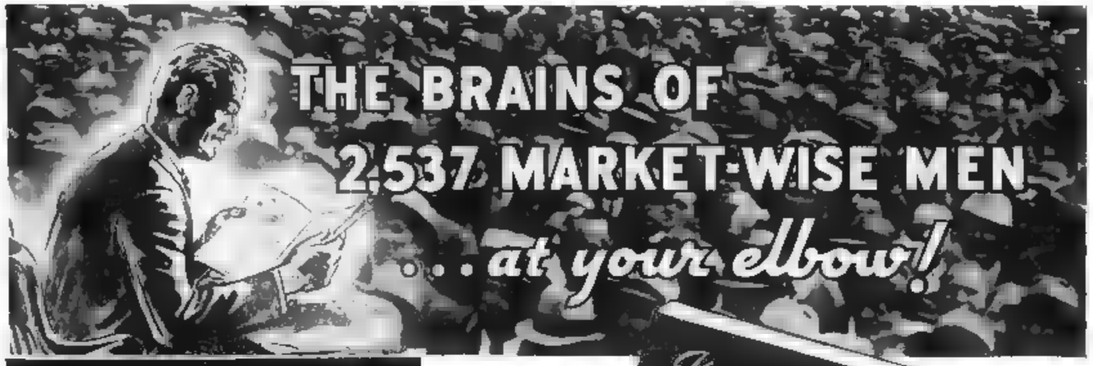
AMERICA: AMERICAN AIRLINES INC..EASTERN ▬ LINES..TWA..UNITED ▬ LINES..PAN AMERICAN AIRWAYS..BRANIFF AIRWAYS..WESTERN AIR EXPRESS..WILMINGTON-CATALINA AIRLINE

EUROPE: OELAG, Austria..■eutsche Lufthansa, Germany..K.L.M., Netherlands..L.A.P.E., Spain..Avio Linee Italiane, Italy..LOT, Poland..C.L.S., Czechoslovakia..Swissair, Switzerland..A.B. Aerotransport, Sweden

SOUTH AMERICA: Pan American Grace Airways

AUSTRALIA: Australian National Airways Pty. Ltd.

ORIENT: Japan Air Transport..China National Aviation Corp...K.N.I.L.M. in Netherlands Indies



CODE of ETHICS

The Associated Business Papers, Inc.

A.B.P. subscribes to the following principles of publication practice:

1—To consider, first, the interests of subscribers.

2—To work for truth and honesty

3—To eliminate his personal [illegible] from news columns, [illegible] to be a leader of thought in editorials.

4—To refuse to publish [illegible], free reading notices or paid "write-ups"; and to measure all news by this standard: "Is it real news?"

5—To decline advertisements which mislead, or do not conform to business [illegible]

6—To solicit [illegible] and [illegible] solely on merit.

7—To supply advertisers with full information regarding character and extent of circulation, subject to authentic verification.

8—To [illegible] with organizations of individuals engaged in creative advertising.

9—To avoid unfair competition.

10—To determine the greatest function of the field he serves, and to promote that function by [illegible] legitimate [illegible]

Add to these principles the fact that A.B.P. publications must also be members of the Audit Bureau of Circulations, where you can readily see that buyers of space in A.B.P. [illegible] waste-free, paid circulation [illegible] worthwhile [illegible] in whichever market they address.

The 1937 Associated Business Papers BLUE BOOK is now available . . . offering you the combined knowledge and experience of 2,537 market-wise men. This improved edition sets forth the ungarnished facts you need to know in appraising the business papers in which you must advertise to build your business.

Perhaps, like most AVIATION advertisers, you are chiefly concerned with selling goods which go into construction and equipment . . . products for operation and maintenance . . . But whatever your aims, this valuable reference book simplifies your problem by combining Audit Bureau of Circulations' measurement of "how many paid readers" with the equally important yardstick of "who reads which papers, and why."

Insignificant, indeed, is the five dollars that will put the new A.B.P. BLUE BOOK on your desk, where it can make your job easier . . . your advertising dollars more effective. A note to AVIATION will bring it.

AVIATION

(A McGRAW-HILL PUBLICATION)

330 W. 42nd St. **New York, N. Y.**

THE NATION'S FIRST CHOICE PRIVATE AIRPLANE

10 REASONS why

STINSON CONTINUES AS PACEMAKER OF THE INDUSTRY . . .

1. ORGANIZATION

Since 1925 Stinson has built more cabin planes than any other manufacturer. Variety of engineering experience, skilled and careful production, national factory trained sales and service stations combine with public acceptance to make the Reliant the Nation's First Choice private plane, leading by a wide margin in quality and quantity of sales in the personal transport class.

2. LEADERSHIP IN [illegible]

Experienced Stinson Engineering has safeguarded life by pioneering [illegible] standard features, wheel brakes, parking brakes, electric starters, safety glass, hydraulic disc brakes, vacuum flaps, controllable propellers, [illegible] metal internal construction and many other features.

3. SAFETY

Flown by pilots both experienced and inexperienced in all parts of the world Stinsons have an unequalled record for safety and reliability.

4. EASIER TO FLY

Inherent stability, high gulled wings, wide landing gear, powerful shock absorbers, non-grabbing brakes, fine vision, finger tip controls and ability to land and take off in small places make Stinsons easier to fly.

5. MENTAL COMFORT

Full knowledge of Stinson's heavy, rugged metal construction and its unequalled safety record give riders that most priceless intangible "Peace of Mind".

6. PHYSICAL COMFORT

A smoother ride, controlled heat and ventilation, transport sound deadening, a roomy cabin, comfortable seats for five and distinctive styling are unmatched by competitors.

7. [illegible]

The Reliant's obvious quality, its beauty and fine reputation have attracted an equally distinguished group of owners whose names [illegible] bywords in business, flying, sports, science and the arts.

8. SPEED [illegible] GOOD

Refusing to sacrifice safety to gain a questionable few minutes [illegible] hundred miles, the Reliant [illegible] as fast as is consistent with comfort and sound safety engineering. Many planes are slower, a very few are slightly faster, none has won the right to be called safer.

9. DISTRIBUTION AND SERVICE

Nationwide sales and service provides the Stinson owner with a factory trained group equipped [illegible] properly maintain and house his plane.

10. ECONOMY [illegible] OWNERSHIP

Careful buyers know that Stinsons are flown for less cost because they are built to endure by the builders of airline transports therefore, used Stinsons command a higher resale price, which lessens depreciation and thus gives a lower cost per mile of flying than any plane in its category.

●

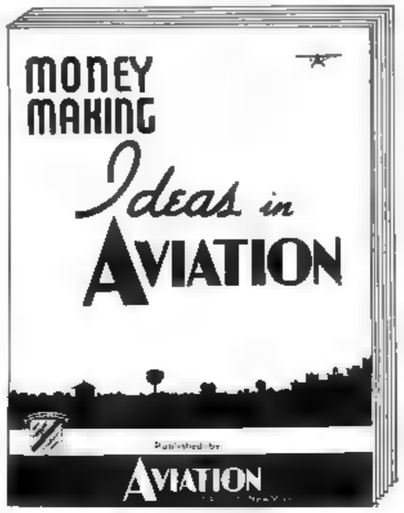
For further information send for a free copy of Stinson Plane News or see your nearest Distributer.

STINSON

AIRCRAFT [illegible]

DIVISION AVIATION MANUFACTURING CORPORATION **WAYNE (Detroit Suburb) MICHIGAN, U.S.A.**

Will You Accept this FREE Book -with your subscription to AVIATION?



This useful book has been developed by the editors of AVIATION to help Students, Pilots, Mechanics, Plane Owners, Fixed Base Operators, Airport and Transport men. It brings you the practical, workaday experiences of men who have made, and are making, their marks in the flying industry. It includes ideas for men in cities or villages, men with little or large capital. Spare time dollars—ways of building business—job getting—saving money on your training—these are a few of the topics covered in this book. Here is invaluable help for newcomer and old timer—and it's our gift to you, with your subscription to AVIATION.

128 Pages of Practical Ideas For You

Dollars from Photography—How to Buy a Plane on $20 a week income—Finding Jobs for Students—Ideas for Charter Service — Fixed Base Problems and Income—Instrument Training from Scratch—Flying Under the Hood—How An Airplane Opens the Door for the Salesman — The Low-Priced Airplane — Maintenance Kinks and Short Cuts — Trends in Sightseeing, Photography, Dusting — Aircraft at Work, as Told by users of Business Planes — and many other articles for everyone interested in the flying industry.

To get your *free* copy of "Money Making Ideas in Aviation" simply use the handy form below. Every paid-in-advance new or renewal subscriber may have a copy of this helpful book, without cost. Send only the regular subscription fee—$3, one year, $4 two years—and your book will come to you at once. There may be just the ideas you need in the pages of this book. Let it, and the monthly issues of AVIATION help you go places in flying. Get your copy at once by filling out the convenient form below and mailing it to us NOW.

MAIL THIS COUPON AT ONCE

Attention: Present Subscribers

You may obtain a copy of this FREE book by renewing your present subscription. *Regardless of when your present subscription expires,* you must send in another PRE-PAID renewal order. Your subscription will be extended for additional time without duplication. Mail in your order and payment today.

All books are sent out by express to insure safe delivery. There is a small charge of 15c—payable to the expressman upon delivery of the book.

Aviation, 330 W. 42nd St., New York, N. Y.

I enclose $4. Enter my subscription to Aviation for two years and send "Money Making Ideas in Aviation" free. I'll pay expressman 15c delivery charges. ( ) If renewal order, please check here.

( ) For 1 year subscription enclose $3 and check here.

Name .....

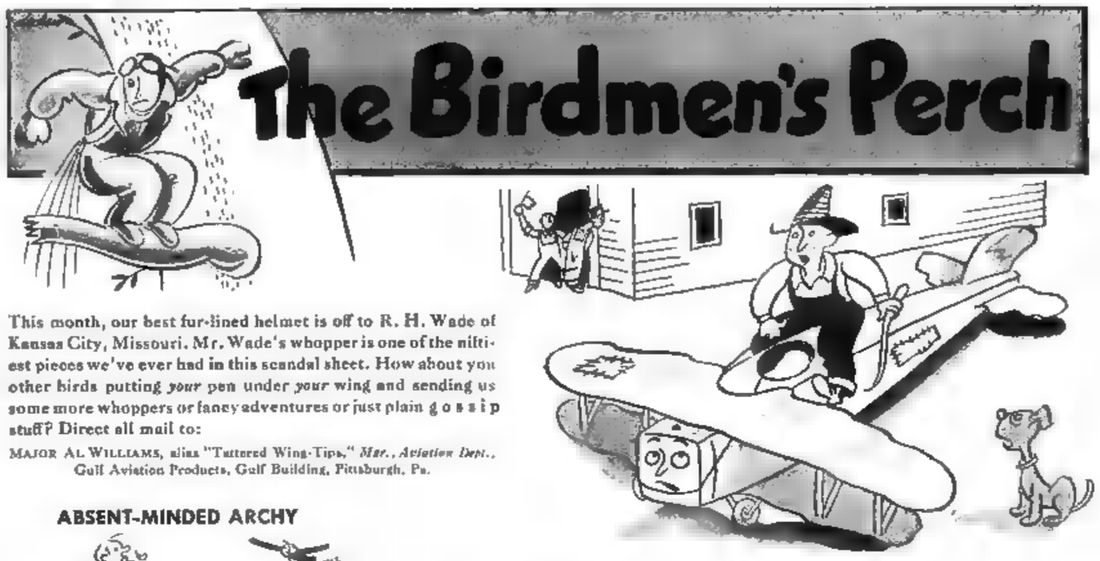
Address .....

City ..... *State* .....

Company .....

Position ..... *Oct.*

This offer Good Only in United States, Possessions and Canada.



This month, our best fur-lined helmet is off to R. H. Wade of Kansas City, Missouri. Mr. Wade's whopper is one of the niftiest pieces we've ever had in this scandal sheet. How about you other birds putting *your* pen under *your* wing and sending us some more whoppers or fancy adventures or just plain g o s s i p stuff? Direct all mail to:

MAJOR AL WILLIAMS, alias "Tattered Wing-Tips," *Mgr., Aviation Dept.*, Gulf Aviation Products, Gulf Building, Pittsburgh, Pa.

ABSENT-MINDED ARCHY

All that this lad's zeal for aviation landed him was a job pushing a lawn mower.

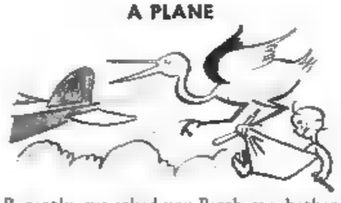
He was a private in the Army Air Corps. One day in the hangar, he was so intent on the model he was building, that he absent-mindedly walked right through the arc of an idling prop without a scratch!

The hangar chief (heart in mouth) saw all. Needless to say, Young Private qualified for the lawn job then and there.

I know, because I happened to be another ambitious private, and saw him do it (also heart in mouth).

—Ralston T. McLaughlin, Pittsburgh, Pa.

FIRST BABY EVER BORN IN A PLANE



Recently, we asked you Perchers whether there had ever been a child born in a plane.

Mr. A. L. Morfee, formerly of the Royal Canadian Air-Force at Cormorant Lake, steps forward—and produces the data.

Place: On board a Fairchild F.C.2. En-route with emergency medical case from Mile 186 to "The Pas Manitoba." Altitude about 2500 feet.

Time: Winter of 1930-31.

Speed: As fast as the mill would drag the crate.

Baby: Cree Indian, male, weight unknown. Christened "Lindbergh Wright Cook." Surname: "Millar."

In attendance: Pilot A. L. Morfee and mechanic. Both half nuts.

Postscript: This birth caused a query as to how the nationality was established.

QUESTION BOX

Question: What is the Alchlor Process?

Answer: It is a special method of refining invented by Gulf, using aluminum chloride (hence: al-chlor). It starts where other processes stop—and gets as much as 20% more waste out of an oil.

Thanks to this exclusive process, *Gulf Aviation Oil* (100% Pure Pennsylvania) is the world's best oil for planes.

LAND'S SAKES!

After the discussion *pro* and *con* as to "How Flies Land" by both the West and the East, we wish to speak in behalf of the flies down South.

In our research laboratories we find that the sober fly of the South lands at the top of a loop; and, to take off, simply finishes his loop—as any sober person can readily see.

But—the flies of the South, Suh, intoxicated by one whiff of Gulf Aviation Gas spin straight up to a perfect four-legged landing.

—Mack T. G. (The Great) Bass, Jr. and H. E. F. C. (His Excellency the Fly Scientist) Mosley Hussey, Jr.

THIS MONTH'S WHOPPER

Down the field come Ebeneezer, settin' in his JN wheezer. Come the time she oughta fly, he'd yank the stick and how she'd try! But somehow she was outa soup; that OX mighta had the croup. The way she sighed and rocked her arms, she filled Old Eben with alarms.

Slow she ambled down the path, and Eben, in his vicious wrath, stomped his feet upon the rudder, left one path to try anudder. Down she rattled by the shed, with Ebeneezer seein' red; and then he pushed against the rod and shoved her nose down toward the sod.

The Jenny screamed, "Now don't be rough!" but Eben yelled, "You choke that guff!" And when upon those ancient plugs the words of Eben fell like drugs, the Jenny started in to roar and down across the field she tore.

She picked her wheels up off the ground and looped and spun and rolled around; because she thought that Eb's word "guff" was just his way of saying "Gulf!" For even when that wheeze is chronic, GULF'S* a famous motor tonic.

(A "tonic," huh? Say, it's a bracer! Eben's JN's now a racer!)

**Gulf Aviation Gas, boys, is the full name.*

—R. H. Wade, Kansas City, Missouri

BREEZE

Your Tank Builder

For Any Size, Shape, Capacity

BREEZE MARK

AIRCRAFT PRODUCTS

Radio Ignition Shielding Assemblies (including Spark Plug Shielding)
Flexible Conduit and Fittings
Junction
Flexible Shaft and Case Assemblies for Remote Control, Tachometer Drives, Fuel Pump Drives, etc.
Aeroflex Flexible Gas and Oil Lines
Internal Tie Rods
Ammunition Rounds Counters
Radio Tuning Units
Propeller Pitch Controls
Generator and Ignition Filters
Elevator and Rudder Tab Controls
Flexible Tubing of Stainless Steel, Aluminum, etc.
Exhaust Gas Analyzers
Fuel & Oil Tanks
Engine Cartridge Starters
Spark Plugs (shielded and unshielded)
Multiple Engine Ignition Switches
Hydraulic Engine Controls

STAINLESS STEEL DIVISION

Pioneers in the design and development of stainless steel structures and stainless steel fabricated products

SEND a sketch or blueprint of your tanks (or tank bay) and we will send a prompt quotation, showing how you will save money and meet delivery dates by letting Breeze be *Your Tank Builder.*

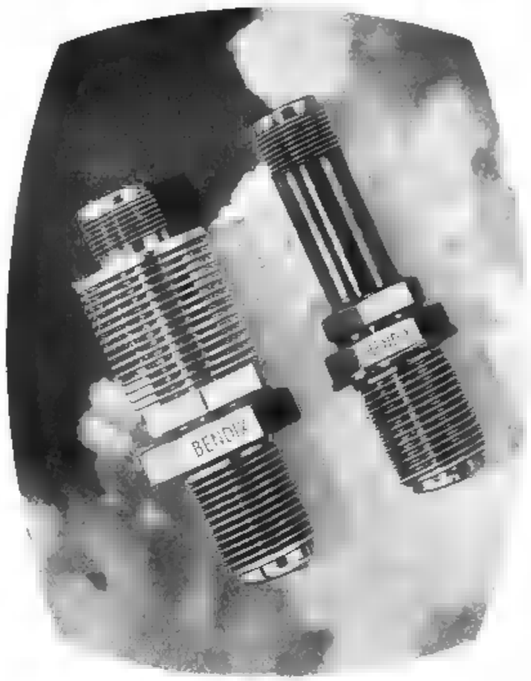
Our patented *hook type* rocker action track joint provides better design, stronger construction, greater flexibility. It eliminates external rivets, reduces the weight, and minimizes the cost. Under test, BREEZE tanks have withstood as much as 100 hours of continuous vibration and drop test with 80% overload.

Look over the list at the left, too, and let us quote you on other superior products made by Breeze for progressive manufacturers of aircraft.

BREEZE CORPORATIONS, INC.

24 SOUTH SIXTH STREET, NEWARK, N. J.

BREEZE PRODUCTS WERE USED BY A MAJORITY OF THE WINNERS OF THE 1937 NATIONAL AIR RACES



At the 1937 National Air Races, Bendix-Scintilla Aircraft Magnetos and Bendix Aircraft Spark Plugs again proved to be a combination of the highest efficiency and reliability

• • •

Planes finishing in first, third, fourth and fifth positions in the Bendix Trophy Race were equipped with Bendix Aircraft Spark Plugs

• • •

SCINTILLA MAGNETO CO., INC.
(Subsidiary of Bendix Aviation Corporation)
SIDNEY, NEW YORK

"CLIFF" HENDERSON managing director of the National Air Races

CHOSE AMERICA'S MOST POPULAR LIGHT AIRCRAFT

— his official scout plane to lead each day's opening ceremonies.

ONLY $1495
F. A. F. Alliance $495 down payment and convenient terms.

Setting the Pace in the light aircraft industry

The new spectacular Taylor designed craft has already won hundreds of fliers. Enthusiastically praised for its comfort, safety and flying ease, their words are true testimonials of the advanced engineering in this outstanding plane. Thanks to C. G. Taylor, designer of over 66% of all registered light aircraft, this latest achievement brings flying within the reach of ■■. Non-fliers can easily learn to master the craft. With dual wheel controls, side by side seating, wide roomy cabin, auto-type instrument panel and modern safety developments, flying is made easy. See the dealer in your locality for a demonstration or write today for descriptive brochure.

FREE
Send Now For Descriptive Brochure.

DESIGNED BY C. G. Taylor

TAYLOR-YOUNG AIRPLANE CO.
ALLIANCE, OHIO

new
PARACHUTE Book
tells

—how the modern parachute was evolved
—the 11 points that parachute engineering must meet
—how the parachute operates; important training data
—the types of parachutes used
—plane equipment: chair chutes
—the Caterpillar Club members

73 Candid Camera Pictures

Write for your copy today—
Ask for "Symbols of Safety."

IRVIN Air Chute

IRVING AIR CHUTE CO., INC.
1670 Jefferson Avenue, Buffalo, N. Y.

Factories at:
1500 Flower Street, Glendale, Calif.
Fort Erie, Ontario, Canada
Letchworth, Herts, England

IN THE AIR AND ON THE GROUND — IT'S RCA ALL THE WAY!

"Made Flying Easy!"

"If more pilots knew what you had to offer... your business would increase many times," says private pilot as he tells experiences with RCA Aviation Radio Equipment

In a voluntary letter, W. M. Packer, flying General Sales Manager of Packard Motor Car Co., says this about the RCA Aviation Radio equipment in his Waco plane:

"Have flown to Pacific Coast, New York and Miami. On all trips used radio equipment. Worked very satisfactorily. Particularly pleased with radio compass. Without fail, it has brought me directly over radio towers. Made flying particularly easy over long stretches with few landmarks. With bad weather, low ceiling and very little visibility, compass enabled me to fly from Kansas City directly to Indianapolis Airport. No trouble with receiver and transmitter. On numerous occasions have talked 100 to 125 miles to Dept. of Commerce Weather Bureau stations. After five months of use, this RCA equipment is efficient, simple to operate, thoroughly dependable."

RCA makes a wide variety of excellent radio products for both airplane and airport. Available at low cost, they offer the safety and dependability of radio that's RCA ALL THE WAY. Write for full details. No obligation.

Here's Mr. Packer alongside his Waco plane. RCA radio equipment on board: AVT-7 Transmitter, AVR-8B Radio Compass and Receiver. 75% of country's airports . . . most planes using them . . . are RCA equipped — PROOF of RCA quality!

RCA *for Aviation Radio*

A SERVICE OF THE RADIO CORPORATION OF AMERICA

RCA Aviation Radio Instruments are sold by AIR ASSOCIATES, INC., Glendale, Calif.; Chicago, Ill.; Garden City, L. I. . . . ■■ write direct to Aviation Radio Section, RCA Manufacturing Company, Inc., Camden, N. J.

THE NUT THAT **UNSHAKO** CAN'T SHAKE LOOSE

—a SELF-LOCKING NUT that can be depended on to hold its grip . . . . . .

Wherever vibration does its best to shake nuts loose there is the need for "Unshako" Self-Locking Nuts. . . the kind that can't shake loose. A built-in locking ring holds them tight, yet they're so ingeniously designed that they can be backed off without a murmur when they're turned with an ordinary wrench. And . . . because there are no extra washers, pins or other gadgets ■■ fuss with, assembly time is considerably less. "Unshakos" can be re-used again and again.

Write us for all the facts—there's no obligation.

CUT AWAY SECTION SHOWING LOCKING RING IN PLACE

STANDARD PRESSED STEEL CO.
JENKINTOWN, PENNA.
BRANCHES: BOSTON, DETROIT, INDIANAPOLIS, CHICAGO, ST. LOUIS, ■■ FRANCISCO
Box 566

Has many uses...

on WINGS

on FUSELAGE

on ■■■■

on TAIL SURFACES

on ■■■■■

AVIATION SCHOOLS

Classified Advertising

10 CENTS A WORD $2.00 MINIMUM

Planes, Engines & Parts For Sale

Indexed—See page 95

WARNER FLEET, condition perfect, [redacted] colors, licensed until Nov. Airwheels, steel prop., priced reasonable. Phone or wire. Midwest Airways Inc., Box 147, Cudahy, Wis. No. 1

GREAT LAKES 2T-1A, excellent condition. Licensed May, 1938. Sutton, 137 Willett Avenue, Port Chester, N. Y. No. 2

CURTIS WRIGHT SEDAN, 4 PCLM. Excellent condition. 210 Kinner recently majored. Ship just relicensed. Landing lights, flares, electric starter, engine driven generator. A real buy, $1500. R. B. Dixon, 3330 Barnett Avenue, San Diego, Calif. No. 3

MOTOR-HEATH B 4 time 20 hours, complete $75. Also Heath ship complete but not covered new $50, trade what have you. Stanley Gerlach, Palmyra, Wisconsin. No. 4

FOKKER AMPHIBION; Hornet B 575 HP with only 94 hours since major, ship excellent condition. Bargain $1000.00 down, balance easy monthly payments, trades accepted. Weddell & Smith, Fairchild Distributors, Detroit City Airport, Detroit, Mich. No. 5

VELIE MONOCOUPE, [redacted] hours, just relicensed, excellent condition, $400.00. S. M. Miller, Cresco, Iowa. No. 6

STINSON 1936 GULL WING. De luxe, beautiful gray and white; flaps, Lycoming-Smith [redacted]trollable propeller, RCA receiver, flares, retractable landing lights, with turn and bank, rate of climb, and air speed properly placed for instrument flying; cruises 141 mph; total time, 160 hours; condition perfect. Price $5,800. Communicate with C. J. McBride, 1411 Walnut Street, Philadelphia. Phone: Rittenhouse 8844. No. 7

TRAVELAIR S-6000 B modernized J6 by NW Airways. New forged pistons, balloon tail wheel. Complete blind flying instruments, radio. $2,000. Watertown Airways, Watertown, So. Dak. No. 8

CURTISS JUNIOR, licensed until March 1938. $400 Fairchild F-8 Aerial Camera with [redacted] extra magazines. $500. Will sell plane and [redacted] for $800. J. G. Ewing & Sons, Box 1023, Baton Rouge, La. No. [redacted]

AIRPLANES, Motors, crackups, salvage. OX-5 jobs $100 up. Complete directory with owner's price, name and address. 25c postpaid. Used Aircraft Directory, Athens, Ohio. No. 10

WACO F3 CONTINENTAL—350 hours total time. Manufactured May 1934. J[redacted] relicensed, perfect condition, red and cream, wheel pants, cockpit cover. $3,000. For quick sale. Will consider trades. Harrisburgh Air Service, Penn Harris Airport, Harrisburg, Pa. No. 11

WACO Custom Cabin for sale, built Nov. 1933, Continental engine, radio, many extras $2500.00. State College Air Depot, Inc. State College, Penna. No. 12

"Classified" INDEX

October, 1937

Advertisements in this classification are numbered (end of last line each ad) for indexing.

OX ROBIN. Millerized, Fahlin prop. 8:50x10 tires. Recovered '35. New motor in '34 turns 1380. Licensed to May '38. Always hangared. $550. Wayne Johnson, Evan, Minn. No. 13

KELLETT AUTOGIRO. 210 HP Continental equipped for banner tower. Full information on request. $2750.00 asking price. F.S. 391, Aviation, 330 W. 42nd Street, New York City. No. 14

33 WACO "C". Con. 210. 400 hours total 180 hours since engine was majored. 70 gal. gas tank. Sensitive alt. bank and turn. Licensed until February 1938. Place at Newark Airport. Reply P. O. Box 456, Lake Mohawk, Sparta, New Jersey. No. 15.

ROBIN, NC373E; late type Challenger [redacted] motor; ship recovered last year. Bank and turn, rate of climb. Best cash offer, trade or will take car down and finance balance. Adams, P. O. Box 1172, Hartford, Connecticut. No. 16

AMERICAN EAGLE. Long nose OX-5. Motor overhauled, ship completely rebuilt and recovered this spring. Relicensed to July 1938. New propeller. $400.00. Frank Headley, Jr., Lincoln Park, New Jersey. No. 17

WACO F KINNER 125, new August 1932, licensed [redacted] September 1938—actually used only 432 hours. Ring, wheel pants, high gloss standard Waco color combination. Finish, fabric and mechanical condition very best. You won't find another one in this condition at $1495.00. Offering [redacted] trade your car and finance substantial balance. Contact at once, I. Walter Selt, 566 Vine Street, Johnstown, Pa. No. 18

THREE AERONCAS: "85" Low wing, late model. Engine and propeller just overhauled, all new pyralin, relicensed. 225 hours total time. Special panel, bank and turn, rate of climb, clock, flap, flares, navigation and landing lights, Exide battery, carburetor heater, other extras. Entire ship in perfect condition and reasonable priced. Two K-37 demonstrators under 75 hours total, each: one standard, other with compass, brakes, oversize tires. Either for $300.00 off list. Basil Aviation Co., Somerton Airport, Phila., Pa. No. 19

REPOSSESSED AERONCA on Edo 1936 flo[redacted], fine condition, first reasonable offer takes it. Salmson [redacted] parts, large stock, low prices. Air Transport Equipment, Inc., Roosevelt Field, Hangar 20-A, Garden City, N. Y. No. 20

STINSON. 1934 Reliant, 225 Lycoming. Excellent condition throughout. Motor just majored. Equipped with pants, starter, standard steel propeller (just re-etched and plated). Cessna Aircraft Company, Wichita, Kansas. No. 21

INLAND SPORT. Lebland 65. For Sale. Licensed. Inquire W. C. Stephenson, Lawton Airport, Lawton, Okla. No. 22

MONOCOUPE with 165 Warner. Always privately owned. A-1 condition, few hours, completely equipped, just relicensed. Cessna Aircraft Co., Wichita, Kansas. No. 23

Continued from page 94

WASP C MOTORED FORD. First class [redacted]dition; new tires, radio receiver, set-up for transmitter, 12 seats; motors 110 hours since majored. Formerly owned by United Air Lines. Will consider 1937 Stinson reliant. Carl Litzenberger, Allegheny County Airport, Pittsburgh, Pennsylvania. No. 24

FAIRCHILD. Model 24; Warner 145. Very clean, lots of equipment; 3-place. Beautiful paint job. Just relicensed. Cessna Aircraft Company, Wichita, Kansas. No. 25

RYAN STA—Used or new ships available for immediate delivery. Authorized dealer. Braman-Johnson, Inc. Hangar B, Roosevelt Field Mineola, N. Y. No. 26

J5 WACO Straighrwing, ASO model, with Bendix brakes, standard steel propellor; many spare engine parts, including Heywood starter. Relicensed last June. $800.00. Devereaux, 356 Beach 13th Street, Far Rockaway, N. Y. No. 27

SPARTAN J6-7. 3-place biplane, licensed until 1938. Motor just majored; good condition, attractive price. Cessna Aircraft Company, Wichita, Kan. No. 28

(OX5) TRAVELAIR. Will convert to J-5. New prop and spinner (15 hours), on motor; 2 new lower wings and recover. Detachable mount. Bendix wheels and brakes (30x5). Everything in perfect shape and just relicensed. $650.00. Paul R. Thompson, 1928 Norton, Independence, Mo. No. 29

K-R 3/4 COMET for sale. 185 hp., Bank & Turn, Rate of Climb. Price, $1200. K-R 21, Kinner, 100 hp., less than 350 hours. Stinson 1934 Reliant. Fully equipped. Landing lights, flares. Scintilla Magneto. Any cash offer. All ships relicensed [redacted] in good condition. New Axelson motor, parts for OX, LeBlond, Challenger. Inertia starters, wings for Eaglerock, and Waco. Accessories. Aviation Service Company, Inc., Hartford, Conn. No. 30

EAGLEROCK, Kinner B-5, extra instruments and booster; condition excellent, only 20 hours since overhaul. Licensed to March 1938. Price $350.00. Merckens, 144 So. Cayuga, Williamsville, N. Y. No. 31

FOR SALE or Charter for winter months. 1937, Cub on floats new condition. Dual [redacted] S. M. Barbee, Jr., Greens Farms, Conn. No. 32

STINSON TRIMOTOR U and T; Pilgrim parts; Hamilton Standard adjustable propellers; Magnetos; Carburetors; Ignition switches; J5 and Waco B cylinders; Air speed indicators; Air temperature gauges; Altimeters; Tachometers. General Airmotive Corporation, Municipal Airport, Cleveland, Ohio. No. 33

AERONCA C3 licensed June 1938. New covering new prop. Also landing gear. Motor in very good condition. Price $525.00. Don Rose, 4539 Rising Sun Avenue, Phila., Pa. No. 33A

PARKS P-1 Biplane for sale. OX powered Total time only 172 hours, in perfect condition. Always hangared. Cheap for cash. Paul P. Patin, Sand Lake, Michigan. No. 33B

STINSON TRI MOTOR: Model U, in A-1 condition, equipt with latest type 600-watt public address system of unusual power and tone. Exceptional money maker for right party. Present owner has other interests. Will sell at bargain or trade for high grade cabin airplane. F.S. 381. Aviation, 330 West 42nd St., New York City. No. 34

CUBS 1936 $895, 1937 $960. Latest 1937 Demonstrator practically new $1095. Aeronca C3 $600. Privateer Amphibian, Kellett Autogiro, latest model perfect condition equipped for banner towing. Will consider any offer. Avian $395, Waco Cabin 1933, $2200; pants, new tires [redacted]. Kinner Eaglerock, American Eagle OX5 recovered and completely renewed throughout $425. Bennett Air Service, Highstown ("Cub-[redacted]") New Jersey. No. 34a

CHALLENGER ROBIN, A-1 condition $750; Whittelsey Avian, just rebuilt and majored $800; Fairchild 22, A-1 condition $1250; Fairchild 21, majored and perfect shape $1150; Lambert Monocoupe, majored $2200. Fleds, Robin, and other parts. Aircraft Brokerage, Flushing Airport, Flushing, L. I. No. 35

WACO 1936 Custom cabin. Lights, flares, bank and turn, climb, clock, radio, pants, steel prop, large tanks; 5-place; Insignia blue with cream trim. 225 Jacobs; 1 year old. 160 hours. Never scratched; priced to sell, cannot be told from new ship. Dixie Airways, Inc., Shushan Airport, New Orleans, La. No. 36

NEW AIRPLANES $25.00 down, easy payments. 7:00x4 Air Wheels with hubs, $16.00 per set. Propellers, $2.98 up. Send 25c for information. Universal Aircraft, Fort Worth, Texas. No. 37

ENGINES AND PARTS for sale. Liberty 400 h. p.; Hispano E 180 h. p.; also quantities of Pratt & Whitney, Wright, Curtiss and Packard engines. The Vimalert Company, Ltd., 841 Garfield Ave., Jersey City, N. J. No. 38

CONTINENTAL MOTOR practically new R670, 225 HP, Latest series. Motor alone lists for $3200. Offering motor, metal propeller, Heywood starter, all for only $1300. Can be installed in new Waco and save buyer over $2000. Bennett Air Service, Highstown, N. J. No. 38a

Products

Books

KNOW Aircraft. Every type. Names, Dates, Records. 92 pictures, $1.00. Blondin Chart Co., Box 34, Los Angeles, Calif. No. 39

Cameras

AERIAL CAMERA for sale: Fulmer Aero Camera Model K-5 with 12" lens cone and extra 20" lens cone, both with F-4.5 anastigmat lens; vertical and oblique [redacted]uspension mounts; floor mounts for use with each cone. In good condition, have been used very little. Contact A. H. Riney, Bartlesville, Oklahoma. No. 40

Fl[redacted]

THREE INTERNATIONAL flares one and one-half minute—complete—new, seventy dollars. L. C. Cook, 604 1st National Bank Bldg., Albuquerque, N. Mex. No. 41

Hangars, Portable

INDIVIDUAL HANGARS—The answer to low cost storage. $365 complete, shipped anywhere. Easily erected. Bennett Air Service, National Distributors, Hightstown, N. J. No. 42

Parachutes

USED PARACHUTES bought, sold and serviced. Joe Crane, Roosevelt Field, Mineola, Long Island, N. Y. No. 43

Pontoons

PONTOONS FOR SALE. Edo Model 3830. Hunter Company, Shrine Bldg., Memphis, Tenn. No. 44

Services

Sales

EASTERN AERONAUTICAL CORP.—24-hour hangar service. Mobilgas and Mobiloil; airplanes for charter and sightseeing. Also Stinson Lycoming Sales and Service. Airport, Newark, N. J. No. 45

Wanted

WANTED—Used airplanes located in New York area. Buyers waiting if the price is right. Send complete description of the ship you have for sale. Breman-Johnson, Inc., Authorized Ryan Dealers, Hangar B, Roosevelt Field, Mineola, N. Y. No. 46

50 USED PARACHUTES WANTED, must be reasonable and preferably Irvins. Used parachutes bought and sold. Agent for Irvin Air Chutes. All types serviced. J[redacted] Crane, Roosevelt Field, Mineola, N. Y. No. 47

WANTED. Bellanca Skyrocket [redacted] Pacemaker. Condition and location unimportant if price is fair. W394, Aviation, 330 West 42 St., N. Y. C. No. 48

Employment Service

AVIATION jobs for inexperienced workers. Send stamp for complete details. Desk D, Airployment, Box 553, West Los Angeles, Cal.

Bulletins Wanted

WANTED—a complete file in good condition of the N.A.P.A. bulletins issued by Secretary Ewge. Answer—M. Van Frank, P. O. Box 892, Cincinnati, Ohio.

U. S. Government

WAR DEPARTMENT, Material Division, Air Corps, Wright Field, Dayton, Ohio, Office of the Contracting Officer.—The War Department invites the submission in competition of sealed bids covering airplanes under conditions set forth more particularly in the following advertisements: Circular Proposal No. 37-650 dated June 24, 1937, Short Range Amphibian Type described in U. S. Army Specification No. 98-612 dated April 5, 1937, bids to be submitted to the Contracting Officer not later than 1:00 P.M., Eastern Standard time February 24, 1938—and, Circular Proposal No. 37-740 dated June 24, 1937, Transport Cargo (two engined) Type described in U. S. Army Specification No. 98-408 dated April 1, 1937, bids to be submitted to Contracting Officer not later than 1:00 P.M. Eastern Standard Time December 28, 1937. Full particulars with respect [redacted] said advertisements may be obtained upon application to the Contracting Officer, Wright Field, Dayton, Ohio, R. W. Propst, Major, Air Corps, Contracting Officer.

Copy for Classified Advertisements in the November Issue Required by October 18

Continued from pages 94 and 95

NEW ENGLAND VALUES

KINNER PLAYBOY: Built for Los Angeles Show; spotless condition; little time; powered with 160 h.p. Kinner $5150.00

1935 WACO: 285 h.p. Wright; Hamilton-Standard Controllable; transmitter; Sperry group; flares & landing lights; special velour upholstery, newly refinished $5250.00

STATES MONOPLANE: Excellent condition, 125 h.p. Kinner; total time 130 hours..... $1200.00

WACO CJC: Seaplane; Wright 250; total time engine 333 hours; bank & turn; rate of climb; receiver; flares; generator; ship excellent condition $4350.00

—Miscellaneous Equipment—

EDO FLOATS: Model 3300—Price $950.00
Model 3430—Price $1295.00

PROPELLERS: Hamilton Standard Steel Propellers for Kinners and Warners. Price $95.00 ea.

STRUTS: Struts for Waco YOC-1; Stinson SR-5-A and Waco, UIC. Price $245.00 per set

—New England Distributors—

STINSON FAIRCHILD AERONCA

INTER CITY AIRLINES, INC.

Boston Municipal Airport East Boston, Mass.
Tel: East Boston 3000

Two **Boeing** Model 80-A airplanes powered with Hornet A-2 engines; particularly adapted for transporting heavy loads from comparatively small fields.

Three **Boeing** Model 40-B single engine airplanes, Hornet A-2 engine; dual cockpits for instrument training.

Used **Hamilton-Standard** two-way controllable propellers; used instruments; used 6" **oil coolers**; three used **Skinner oil reclaimers**; other used serviceable equipment.

UNITED AIRLINES TRANSPORT CORPORATION

5936 South Cicero Avenue Chicago, Ill.

Wanted: **Odd lots OX5 motors & parts**

Tires: 14x3, $3; 18x3, $2.50; 20x4, $4; 24x4, $1.50; 28x4, $1.50; 26x4, $7; 30x5, $2; 32x6, $3; 36x5, $5; 40x10, $10; 44x10, $10. **Tubes also, Motors, parts, wings, wheels. Monocoupe $150.**

NORTHROP AEROPLANE CO.

Minneapolis Minn.

We are offering for sale a large Inventory of

LYCOMING and WASP STINSON "A" and FORD

parts at attractive prices.

Write for complete lists.

Pennsylvania-Central Airlines Corporation

Allegheny County Airport, Pittsburgh, Pa.

Additional Advertising of Planes, Engines and Parts, Services, Wanted and Employment Opportunities — See Pages 93, 94, 95 and 97

WHERE TO BUY

NEW EQUIPMENT—ACCESSORIES—MATERIALS—SUPPLIES

Schrader

REG. U. S. PAT. OFF.

TIRE VALVE REPLACEMENTS

Preferred by Tube Manufacturers, aviators and service men. Reliable double seal gives 2-to-1 safety factor. Standard for all tire valve sizes.

Packed in metal boxes of five, or bulk packages of 100.

A. SCHRADER'S SON

Brooklyn New York

Division of Scovill Manufacturing Co., Inc.

TRADE MARK

NOC-OUT HOSE CLAMPS

THE HOSE CLAMP WITH THE THUMB SCREW

Standard equipment of the automotive industry. Adjustable - one size equals many. Quick tightening, perfect seal. At all Jobbers.

Pat. No. 1,362,813.

WITTEK MFG. CO.

4305 W. 24th Pl., Chicago, U. S. A.

STOP BATTERING

powerful—accurate

NON-MARRING

With Chicago Rawhide Hammers you don't have to "pull punches." You can strike powerful, effective blows *safely* for coiled rawhide faces will not mar or batter. Tough, resilient (non-rebounding) long-lived and replaceable—insert in permanent malleable iron heads that give the balance and accuracy of a fine tool. A complete range of sizes. Write for circular.

CHICAGO RAWHIDE MFG. CO.
1226 ELSTON AVENUE CHICAGO

CHICAGO *Rawhide* HAMMERS

PHENIX NITRATE DOPES—None Better

Clear—$1.12 per gal. in 50-gal. drums, included.
Clear—$1.18 per gal. in 30-gal. drums, included.
Clear—$1.38 per gal. in 5-gal. boxed cans.
Thinner—$1.18 per gal. in 5-gal. boxed cans.
Pigmented—$1.77 per gal. in 5-gal. boxed cans.
Yellow, Blue, Green, Red, Cream, Galatea, Khaki, Aluminum, Black, White. All fresh made from new and high grade materials. Immediate shipments.

PHENIX AIRCRAFT PRODUCTS CO.

Williamsville, N. Y.

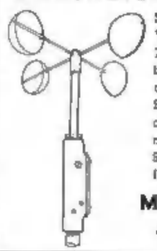
STANDARD AIRCRAFT FINISHES

Since 1913

TITANINE

TITANINE INC. UNION, N. J.

ANEMOMETER



Standard 4-cup type. Weather-proof spindle box, copper cups, brass arms, wheel hub, and spindle sleeve. Stainless steel spindle, cilless bearings. 1/60th mile electrical contacts. $8.00 complete. Write for information:

M. C. STEWART

Arlington, Mass.

Mechanically Strong

FUSES

that are in no way affected by severe vibration. Precision Aircraft Littelfuses for low or high voltage. Neon Potential Fuses and Indicators. See your jobber or write for Instructive Catalog 50.

LITTELFUSE LAB., 4264 Lincoln Ave., Chicago

Teicher Manufacturing Corp.

30-15 47th Ave., Long Island City, N. Y.

AIRCRAFT SHEET METAL ACCESSORIES

COWLINGS - FAIRINGS - SPINNINGS
TANKS - HANDHOLE COVERS

? *Find what you are looking for? If this or other advertising in this issue does not supply the information wanted, of products or services, write* ?

AVIATION
330 West 42d Street, New York, N. Y.

Continued from pages 94, 95 and 96

FORCED TO SELL AT ONCE

RYAN-ST; 125 h.p. Menasco. Has been privately owned. Only 68 hours total. Wonderful condition. Many extras. $3,250.00.

WACO, 1936 Custom. Jacobs 285. Many extras. Fine condition. $4,500.00.

WACO, 1937 S-7. Five place. Like new. $4,125.00.

MONOCOUPE, 1934 Model D. 145. h.p. Super Scarab Warner. COMPLETE instruments and radio. $1,750.00.

WACO, 1934 Cabin. Many extras. Fine condition. $2,520.00.

The above planes are priced from 20 to 40 percent under the market. Here is your chance to fly one year without depreciation. Act quick. You cannot appreciate these bargains until you see them.

TERMS

THE H. C. ROBBINS COMPANY

Cleveland Airport Cleveland, Ohio

Vultee V-1A Transport

AIRPLANES

Ten Place Planes with Wright Cyclone Engines; New and Used Planes Available.

ENGINES

Manufacturer	Type	H.P.
Pratt & Whitney	Hornet (Geared)	575
Pratt & Whitney	Hornet	525
Pratt & Whitney	Wasp	450
Wright	J-6	300
Wright	J-5	225
Curtiss	D-12	435
Curtiss	Conqueror	600

Engines available in quantities

Can supply used engines and engines fully major overhauled by Government approved and factory authorized repair stations.

THE VIMALERT COMPANY, LTD.

813 Garfield Ave., Jersey City, N. J.

USED SHIPS FOR SALE

NC 13612 1936 BEECHCRAFT 285 HP Jacobs motor. Light blue, black-and-red striping, 74 gal. gas capacity, Turn & Bank, Rate of Climb, Thermocouple, RCA Receiver, Landing lights, Flares. Total time 492 hours, 183 hours since motor major. Excellent condition, beautiful finish $6,000

NC 15845 1936 BEECHCRAFT 285 HP Jacobs motor. Dark blue with silver striping, 74 gal. gas capacity, Turn & Bank, Rate of Climb, RCA Receiver, Landing lights, Flares. Total time 256 hours. Excellent condition, beautiful finish $7,000

NC 16439 1936 BEECHCRAFT 285 HP Jacobs motor. Dark blue, yellow striping, 74 gal. gas capacity, Turn & Bank, Rate of Climb, Landing lights, Flares, RCA Receiver. Total time 256 hours. Excellent condition, beautiful finish $7,000

NC 16520 1936 WACO CUSTOM 285 HP Wright motor, Controllable propeller, Turn & Bank, Rate of Climb, Flares, Landing lights, RCA Receiver, Clock, Thermocouple, Manifold pressure gauge, Carburetor temperature gauge, Cactus-proof tires, special Diaka cream with blue striping. Beautifully finished throughout. Total time 83 hours. Like new $8,500

NC 809-W SIKORSKY S-39 AMPHIBIAN Pratt-Whitney 400 HP motor. Gray hull, silver wings, RCA radio, Turn & Bank, Rate of Climb, Long distance gas tanks, special streamlining. Beautifully finished. Total time since complete overhaul 320 hours $13,000

NC 16044 S-T-A RYAN. Built November 1936, 125 HP Menasco motor. This is the famous ship with the Attack-type Sliding Winter Enclosure, Turn & Bank, Rate of Climb, and Position lights, new June 1937 Dural Cowling just installed. Total time 151 hours. Brand new Hartzell propeller..... $5,700

NC 17300 S-T-A RYAN November 1936, 125 HP Menasco motor. All standard factory instruments including compass, ELECTRIC STARTER, booster, battery, wired for lights. Total time 162 hours. Time on engine since major overhaul 24 hours. Brand New Hartzell propeller, ... $4,000

NC 17347 1937 STA 125 HP **RYAN** right out of our last carload. Our Sales Manager's personal demonstrator. All standard equipment. Total time, 84 hours. A saving to you of $600.00 over the delivered New York price..... $4,800

O. J. WHITNEY, INC.

North Beach Airport,
Jackson Heights, N. Y.
NEwtown 9-0300

NEW
WRIGHT GYPSY
AND
AMERICAN CIRRUS
ENGINES AND PARTS
MENASCO MANUFACTURING CO.
6714 McKinley Ave., Los Angeles, Calif.

Frank Ambrose, Inc.

Dealers and Exporters

Airplanes, Engines & Supplies

MUNICIPAL AIRPORT NO. 2
JACKSON HEIGHTS, NEW YORK CITY

Waco F

100 H.P. Kinner K-5 engine, side exhaust; total time 362 hours. Total time on ship—815 hours. Semi-air wheels with brakes, dual controls. Just relicensed. Excellent condition.

* * * * * *

Warner 125 h.p. **Engines** just majored.
J-5 and J-7 Standard Steel Propellers.
J-5 exhaust & intake valves—new & used.
J-5 link rods, new.
J-5 exhaust guides, new.
Prompt service on Continental A-40 parts!

SNYDER AIRCRAFT COMPANY

Municipal Airport, Chicago, Illinois

Teech Aircraft, Inc.

STINSON

DISTRIBUTORS

Hangar F, Roosevelt Field
Mineola, L. I., N. Y.
Telephone Garden City 3308

Westchester Airport
Armonk, N. Y.
Telephone Armonk Village 308

SPECIAL

36 WACO DQC

LIKE NEW

285 Wright, Controllable prop, complete night and blind flying equipment.

EARL E. BACH

499 River Rd. Red Bank, N. J.

FOR SALE

WACO YKS STANDARD 36

Jacobs 225 H.P., licensed, five place, seventy gallons gas and 100 lbs. of baggage, 250 hours time, 150 since major by P.A.C. $4,000.00

STINSON RELIANT 33

Radio, blind flying instruments, landing lights and flares, 650 hours total, 150 since major. $2,000.00

AIRTECH FLYING SERVICE, Ltd.

Lindbergh Field San Diego, California

SUITS

Flying Suits, full blanket lined, zipper throughout, 6" fur collar, belt, all sizes now $11.75. Free with each suit Navy winter leather helmet, chamois lined, fur interlined. Helmets are large size only. Close out, order early.

AIR TRANSPORT EQUIPMENT CO.

Garden City, N. Y.

FLYING INSTRUCTIONS

Open Ships, Cabin Ships Ford Tri-Motor

Complete Flying Courses
Instrument Flying
Mechanical Training

Sundorph Aeronautical Corp.

Cleveland Airport

ATTENTION!

New stock 26x4 tubes	$1.50
Nitrate Dope 5 gal. drum	6.00
Tail wheel tires & tubes	1.00
Chamois lined leather helmets	1.85
Winter flying suits	9.00
American Eagle (long nose) less motor	160.00

NORTHROP AEROPLANE CO.

Minneapolis Minn.

PRICED FOR QUICK SALE

Fairchild 22, powered with inverted Cirrus Engine, 2P.O.M. Blind flying instruments. Very good condition.

1937 Taylor Cub Demonstrator.

Travelair cabin 6 place, model 6000B, powered with a Wright J6-9 330 H.P. Plane recently overhauled and recovered. Engine completely major overhauled, 750 hrs. total flying time. Equipped for night flying, also has starter. This plane looks and flies like new.

Travelair Speedwing Biplane, 2 place, E4000, powered with a Wright J6-5, 175 H.P. Plane has been completely overhauled, and recovered. Engine major overhauled at a cost of $900. Best flying aeroplane in its class. Must be seen to be appreciated.

ENGINES FOR SALE

Comet 7 Cylinder Radial Engine. Curtiss OX5 D. H. Gipsy, 90 H.P. 85 hours total

Will take plane or automobile in trade.
Terms can be arranged.

MADISON AIRWAYS

MADISON AIRPORT Madison, Wis.

"BETTER AIRPLANES FOR LESS"

AMERICAN EAGLE, E-430, Cont. 165 HP, 4 PCLM $1,150.00
ARROW SPORT V-8, 35 hrs. since new. 1,550.00
BEECHCRAFT B-17-L, Jacobs 225, 50 hr. 6,500.00
BIRD BK, Kinner K-5-100 HP..... 1,250.00
FLEET, Model 2, LESS MOTOR, completely recovered, refinished, Like New. 1,350.00
Same FLEET with K-5 motor..... 1,850.00
KINNER SPORTWING, B-5-125 HP.... 1,950.00
MONOCOUPE, Lambert 90 HP..... 1,275.00
ROBIN, Challenger 195..... 975.00
RYAN B-5, J6-9..... 1,750.00
STINSON RELIANT, 1934, control. prop. 3,750.00
STINSON RELIANT, 1934, flares..... 3,500.00
WACO CUC, Wright 285 HP, control. prop. 4,500.00
WACO YKC, Jacobs 225, [illegible] equipment 3,250.00
Time Payments—50% Down—Balance in 12 Mos.

AERO BROKERAGE SERVICE COMPANY

E. L. ERICKSON

LOS ANGELES AIRPORT - INGLEWOOD, CALIF.

"Selling the World Over"

You Can Afford to Have Your Instruments, Airplane and Engine Overhauled in the largest and best equipped Approved Repair Depot in the Middle West, approved for all classes of work.

Write for flat rates on instruments, airplane and engine work

PARKS AIRCRAFT REPAIR DEPOT, East St. Louis, Ill.

INDEX TO ADVERTISERS

SCHOOLS

CLASSIFIED ADVERTISING

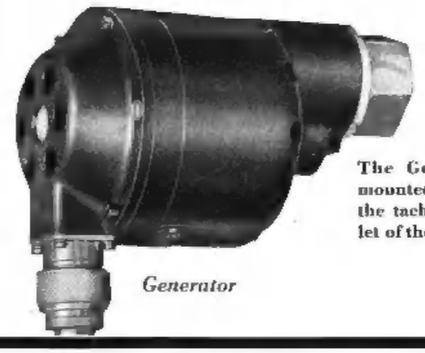
Searchlight Section

KOLLSMAN ELECTRIC TACHOMETER

Sensitive Indicator

Standard Indicator

Instruments shown seven-eighths actual size. Generator three-fifths actual size.



Generator

The Generator is mounted directly on the tachometer outlet of the engine.

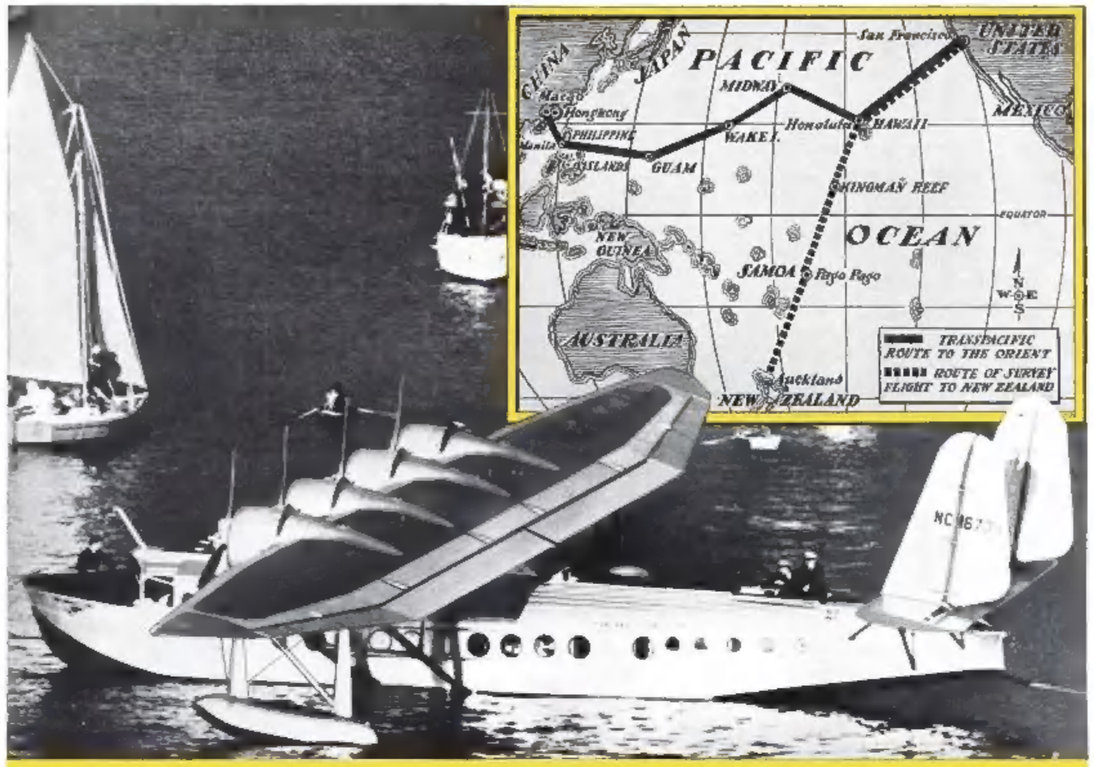
The Kollsman Electric Tachometer has solved the problem of indicating speeds of wing-mounted engines. There are two types of indicators: *Standard*, with 1¼ turns of the hand; *Sensitive*, with 3½ turns of the hand, for 3500 r.p.m. Both types are accurate to within 10 r.p.m. Temperature errors are less than 1 per cent from –35° to +60° C. One generator will operate either one or two indicators with no loss of accuracy. Generator mounts directly on tachometer outlet of engine; runs right or left hand. Connection from generator to indicators is by shielded cable—any length—with standard plug connectors. All generators and indicators are *interchangeable*. There are no brushes, commutators, or slip-rings; no radio interference. Lifetime sealed lubrication. Write for detailed specifications and full information.

★ **Ask about the Kollsman system of integral electric lighting**

KOLLSMAN

KOLLSMAN INSTRUMENT COMPANY, INC., 3 JUNIUS STREET, BROOKLYN, N. Y.

WESTERN BRANCH: GRAND CENTRAL AIR TERMINAL, GLENDALE, CAL.



PAN AMERICAN CLIPPER BLAZES TRAIL TO NEW ZEALAND

• Setting down at Auckland Harbor, the China Clipper successfully completed the first flight from Hawaii to New Zealand—a 5,000 mile stretch via Kingman Reef and Pago Pago.

The flight, undertaken as part of a three year survey, is the forerunner of the establishment of regular four-day service, 7,000 miles between San Francisco and New Zealand.

Seventy-two Thompson Valves are standard equipment in the four Pratt and Whitney Hornet engines that powered the huge Sikorsky S-42B which spanned the ocean from the Hawaiian Islands to New Zealand.

Returning over the same route, the big ship, rechristened the Hong-Kong Clipper, inaugurated the first complete air mail and passenger service between the United States and China.

In addition to Thompson Valves over 200 other vital parts are made by Thompson Products, Inc., for leading aeronautical builders.

THOMPSON PRODUCTS, INC. • Cleveland • Detroit

Thompson Valves

Eclipse
STARTERS

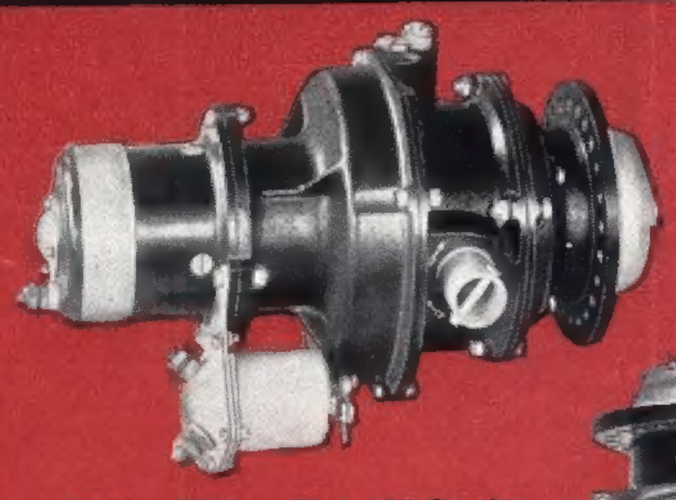
In aviation, confidence starts with starting. For two decades the responsibility for this vital function has rested with *Eclipse Aviation Corporation*.

Eclipse engineering and research resources have matched the swift pace of improvement in engine design, have met the individual needs of many varied conditions of application, operation and servicing.

***Eclipse Aviation Corporation* offers the following basic type starters, operating from various power sources, to serve specific purposes:**

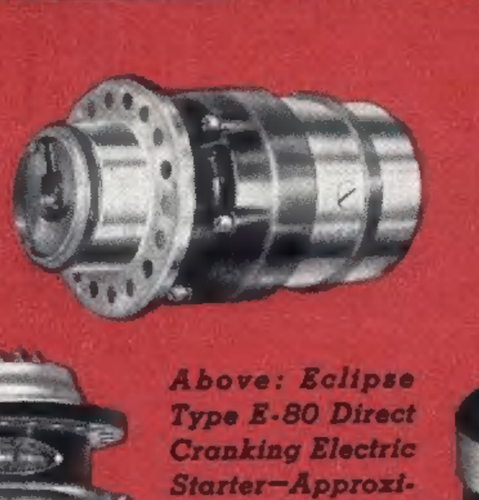
POWER SOURCE	STARTER-TYPE
Manual	(a) Inertia (Manual only) (b) Hand Turning Gear
Electricity (DC-12 or 24 volt)	(a) Inertia (Combination Manual and Electric) (b) Direct Cranking Electric
Air Pressure	(a) Air Injection
Cartridge (Powder)	(a) Combustion
Electricity (AC-110 volt – 800 cycle)	(a) Inertia (Combination Manual and Electric) (b) Direct Cranking Electric

ECLIPSE AVIATION CORPORATION
EAST ORANGE, N. J.
(Subsidiary of Bendix Aviation Corporation)

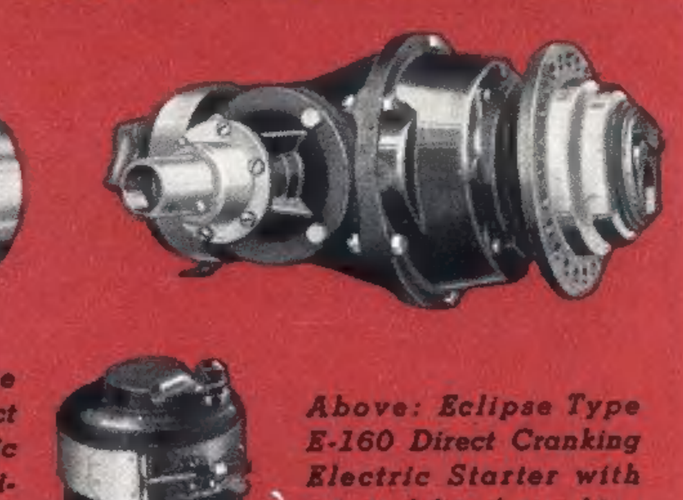


Above: Eclipse Series 11 Combination Hand and Electric Inertia Starter for 12 or 24 volt operation available with complete remote controlled acceleration and engaging means.

Right: Eclipse Combustion Starter operating from power developed by remotely controlled igniting of concentrated energy in cartridge form.



Above: Eclipse Type E-80 Direct Cranking Electric Starter—Approximate maximum engine capacity—250 H. P.



Above: Eclipse Type E-160 Direct Cranking Electric Starter with integral hand cranking gear, for 12 or 24 volt operation and providing push button remote engine starting control.

Left: Eclipse Type Y-150 Direct Cranking Electric Starter — Approximate maximum engine capacity—145 H.P.